Early Neanderthal social and behavioural complexity during the Purfleet Interglacial: handaxes in the latest Lower Palaeolithic.

DALE, LUKE,CHRISTOPHER

Early Neanderthal social and behavioural complexity during the Purfleet Interglacial: handaxes in the latest Lower Palaeolithic.

Luke Christopher Dale.

Only a handful of 'flagship' sites from the Purfleet Interglacial (Marine Isotope Stage 9, c. 350-290,000 years ago) have been properly examined, but the archaeological succession at the proposed type-site at Purfleet suggests a period of complexity and transition, with three techno-cultural groups represented in Britain. The first was a simple toolkit lacking handaxes (the Clactonian), and the last a more sophisticated technology presaging the coming Middle Palaeolithic (simple prepared core or proto-Levallois technology). Sandwiched between were Acheulean groups, whose handaxes comprise the great majority of the extant archaeological record of the period – these are the focus of this study. It has previously been suggested that some features of the Acheulean in the Purfleet Interglacial were chronologically restricted, particularly the co-occurrence of ficrons and cleavers. These distinctive forms may have exceeded pure functionality and were perhaps imbued with a deeper social and cultural meaning.

This study supports both the previously suggested preference for narrow, pointed morphologies, and the chronologically restricted pairing of ficrons and cleavers. By drawing on a wide spatial and temporal range of sites these patterns could be identified beyond the handful of 'flagship' sites previously studied. Hypertrophic 'giants' have now also been identified as a chronologically restricted form. Greater metrical variability was found than had been anticipated, leading to the creation of two new sub-groups (IA and IB) which are tentatively suggested to represent spatial and perhaps temporal patterning. The picture in the far west of Britain remains unclear, but the possibility of different Acheulean groups operating in the Solent area, and a late survival of the Acheulean, are both suggested. Handaxes with backing and macroscopic asymmetry may represent prehensile or ergonomic considerations not commonly found on handaxes from earlier interglacial periods. It is argued that these forms anticipate similar developments in the Late Middle Palaeolithic in an example of convergent evolution.

Early Neanderthal social and behavioural complexity during the Purfleet Interglacial: handaxes in the latest Lower Palaeolithic.

Luke Christopher Dale.

Submitted for the Degree of Doctor of Philosophy

Department of Archaeology

Durham University 2021.

Contents.

List of Figures.

List of Tables.

Copyright Statement.

Acknowledgements.

This work was undertaken whilst in grateful receipt of a studentship provided by the Arts and Humanities Research Council (AHRC) Collaborative Doctoral Partnership (CDP) programme, jointly supervised by Durham University and the British Museum. This funding not only allowed the research project to take place, but provided generous support for conference attendance, museum visits, training and development. I cannot recommend the AHRC CDP highly enough. The support provided by Sarah McEvoy (CDP co-ordinator) and JD Hill (CDP Consortium Chair) was also invaluable.

My thanks next to Mark White (Durham University), Nick Ashton (British Museum) and David Bridgland (Durham University), who formed my supervisory team. Their cumulative knowledge in the field of early prehistory, and their willingness to share that knowledge and guide my research, made the following thesis possible. My thanks also to the wider community of prehistorians, particularly at the British Museum and the team involved with the excavations at Barnham, for their advice; particularly Rob Davis, Clare Lucas and Beccy Scott, along with many others. I would also like to thank Aaron Rawlinson (now Dr. Rawlinson, and deservedly so), a fellow PhD student and the author of a piece of research which parallels my own work. Aaron was my companion for much of the data collection and fieldwork associated with this project, a good friend, and an excellent archaeologist.

My data collection was greatly aided by visits to museums across the country; my thanks to Nicholas Crowe (Pitt Rivers Museum), Imogen Gunn (Cambridge Archaeology and Anthropology Museum) and Matt Riley (Sedgewick Museum) for facilitating these visits and making me feel welcome. I was fortunate enough to undertake a research visit to the Royal Ontario Museum in Toronto (funding for which was gratefully received from the Lithic Studies Society, the Prehistoric Society, Durham University Archaeology Department and St. Cuthbert's Society); this was facilitated by Dr Chen Shen and Cheryl Copson, who lived up to the friendly reputation enjoyed by Canadians. I undertook two museum placements whilst conducting this research, funded by the AHRC CDP programme; whilst not directly relevant to the following research, these were invaluable opportunities for my personal and professional development and as such I thank Andrew Woods (the Yorkshire Museum) and Hugo Anderson-Whymark (the National Museum of Scotland).

Finally, and most importantly, I would like to thank my parents who have not only tolerated, but actively supported me in my elongated academic career (which has now spanned about 12 years since leaving school), and my partner Meredith, without whose support I would probably never have started the project, let alone finished it.

Chapter One: Introduction.

1.1. Introduction.

The handaxe is the defining component of the long-lived Acheulean technocomplex, which first occurred in the northern East African Rift around 1.76 – 1.74 Ma. (Beyene et al. 1997; Lepre et al. 2011), spreading into parts of Asia between 1.4 – 1.2 Ma. (Bar Yosef et al. 1993; Pappu et al. 2011), and potentially into Europe by c. 1 Ma. (Vallverdu et al. 2014). So significant is the handaxe to academic research, public perception, and museum collections, that it has become synonymous with the Acheulean and with the Lower Palaeolithic in general. The first appearance of the handaxe in Britain is thought to have occurred in MIS 15, at sites such as Brandon Fields and Maidscross Hill relating to the extinct river Bytham (Ashton & Davis 2021; Davis et al., 2021). More geographically widespread evidence of handaxes is then found at sites such as Happisburgh I and Boxgrove, dated to MIS 13 (Roberts et al., 1999; Lewis et al. 2019), as well as sites on the Thames (such as the Caversham Ancient Channel) which may represent MIS 13 handaxes reworked into MIS 12 deposits (Roe 1994). The Acheulean remained the dominant technocomplex in Britain until MIS 8, barring two short-lived hiatuses at the beginning of MIS 11 and 9 where non-handaxe technology dominated, after which tools produced by the Levallois technique dominate assemblages (Scott 2010; Scott et al., 2010).

The end of the Acheulean coincides with (and to some degree, marks) the termination of the Lower Palaeolithic and the beginning of the Middle Palaeolithic. This Lower – Middle Palaeolithic transition marks the first major innovation in stone tool technology for over a million years, yet it has received less attention than other transitions in human development (Hopkinson 2007), at least in part due to the compressed glacial chronology in use until the 1980s which obscured meaningful patterning in the archaeological record at all but the grossest scale. As such, the Lower – Middle Palaeolithic transition was for a long time considered to be signified simply by the replacement of handaxes with Levallois technology. The expanded glacial chronology, based on the identification of Marine Isotope Stages (MIS) allowed the Lower – Middle Palaeolithic transition to be re-evaluated, revealing a far more drawn-out transitional process occurring over two previously unidentified interglacial stages (the Purfleet Interglacial, MIS 9, and the Aveley Interglacial, MIS 7) (Shackleton 1987; Bassinot et al., 1994; Bridgland et al., 1994; Railsback et al., 2015). Although the ultimate replacement of handaxes with Levallois technology is still regarded as a significant developmental milestone, it is now considered alongside a whole suite of behaviours and societal changes which together constitute the process of 'Neanderthalisation' (White & Ashton 2003; Scott 2010; White et al., 2011; Rawlinson 2021). The Early Middle Palaeolithic (MIS 7, c. 240ka.) has received long overdue attention in recent years (e.g., Scott 2010) - not so the opposing side of the transition representing the latest Lower Palaeolithic, the MIS 9 interglacial. Despite this, recent work at the type-site at Purfleet and a handful of other 'flagship' sites has shown MIS 9 to be a period of unprecedented complexity and change (Bridgland et al., 2013; White & Bridgland 2018). The archaeological record shows a unique tripartite succession of industries, commencing with a core-and-flake industry lacking handaxes (the Clactonian), followed by the Acheulean, and concluding with early expressions of Levallois technology (proto-Levallois, or simple prepared core technology).

This study will focus exclusively on the handaxe component of the Acheulean in Britain during the Purfleet Interglacial, encompassing the hominin occupation of Britain from the first recolonisation in late MIS 10 to the regional extirpation of hominins in MIS 8 (a period abbreviated hereafter to MIS 9, except in cases where more specific dating has been suggested). This work has been undertaken in tandem with a doctoral research project by Aaron Rawlinson (Durham University), who has produced a comprehensive and insightful analysis of the non-handaxe components (the Clactonian, flake tools and Levallois) of MIS 9 in Britain.

1.2. Background to study.

Two seemingly contradictory observations have often been made of the handaxe: the first, is that the Acheulean was a relatively static and unchanging industry throughout its long history: Isaac (1977) described morphological patterning in the archaeological record as a 'random walk', with innovations infrequent and short-lived. The second is that a great deal of variation in morphology and typology can be observed within the broad definition of 'handaxe', at both an inter- and intra-site level (Roe 1981). Interpreting this variation has been one of the most productive and controversial challenges of Lower Palaeolithic research. Early attempts to explain the observed variability in handaxe morphology invariably drew on evolutionary frameworks, reasoning that relatively crude or irregular forms would naturally precede refined, elaborate and symmetrical forms. Improved dating of the Quaternary deposits in which handaxes typically occur found no evidence for such an evolutionary progression, however. In British research, attention shifted to identifying overarching morphological patterning which could be established without drawing on ideas of 'evolutionary' progression. Most significant of these was the morphometric study of Derek Roe (1964, 1968a), which built on the methodology of Bordes (1961). Roe was able to identify discrete morphometric groups of handaxe assemblages using shape descriptive indices, based in turn on a small number of simple metrical characteristics. At the same time, John Wymer published a detailed review of the Lower Palaeolithic archaeology of the Thames using his own typological scheme (Wymer 1968). Although both Wymer and Roe tentatively suggested a possible age correlation between sites with similar handaxe preferences (based on shared typological characteristics in the case of the former, and morphometric groupings in the case of the latter), the compressed chronological framework of the time did not permit robust age correlation. Roe's morphometric groups were revisited by Bridgland & White (2014, 2015, 2018; White 2015; White et al. 2018; White & Bridgland 2018) who, armed with an updated chronological framework based on the Marine Isotope Stage record and Bridgland's climatically driven model of terrace formation (e.g., Bridgland 1994, 1996, 2003, 2006), were able to identify strong chronological patterning which associated handaxes of specific MI stages with Roe's morphometric groups. Similarly, the expanded Quaternary glacial chronology allowed patterns in certain chronologically restricted types (e.g., twisted ovates, ficrons and cleavers) to be identified (White & Jacobi 2002; Westaway et al., 2006; White et al. 2018, 2019).

The position of the MIS 9 interglacial immediately before the crucial Lower – Middle Palaeolithic transition, and the relative paucity of research into the MIS 9 interglacial as a discrete chronological unit make it a valuable target of study. White & Bridgland's reanalysis of Roe's (1968a) data strongly suggested that handaxe assemblages which aligned with Roe's Group I (pointed shapes, with cleavers) could be dated to MIS 9 (Bridgland & White 2014, 2015, 2018; White 2015; White & Bridgland 2018; White et al., 2018). Likewise, it has been suggested that the co-occurrence of small numbers of ficron and cleaver-type handaxes is typical of MIS 9 assemblages and may represent a chronologically restricted occurrence (Wenban-Smith 2004, 2006; Bridgland & White 2014, 2015, 2018; White 2015; Davis et al., 2016; White & Bridgland 2018; White et al., 2018).

1.3. Aims.

This study aims to produce a far-reaching, comprehensive analysis of handaxes from sites dated to MIS 9 in southern Britain. Using metrical, typological and technological analyses, the following key themes and questions will be addressed:

- Chronological patterning in the MIS 9 interglacial.
    - Can previously suggested morphological preferences be identified consistently in MIS 9 assemblages? Previous work by Roe (1968a) identified groups of handaxe sites which shared broad morphological preferences, and which were suggested to be chronologically significant by Bridgland & White (2014, 2015, 2018; White 2015; White et al., 2018). Sites dated with varying degrees of confidence to MIS 9 generally fell within the morphometric range of Roe's Group I (pointed, with cleavers) and Group III (pointed, with plano-convex handaxes). However, Roe's original Group I included only six sites; Group III included only one. By increasing the

number of chronologically relevant sites, the wider validity of this chronological patterning may be established.

- Similarly, can the suggested chronologically significant co-occurrence of ficrons and cleavers be supported across a larger number of sites?
- Can chronological patterning *within* MIS 9 be identified? Although relatively few sites have secure marine isotope sub-stage attributions, it may be possible to identify handaxe assemblages formed earlier or later in the interglacial. Changes in morphology and typology may be established through comparison of these sites. A precedent for exploring sub-stage variation in handaxes was established by White et al. (2019) and Ashton & Davis (2021), who identified both sub-stage chronological and geographical patterns in handaxe morphology in earlier interglacial periods.

- Geographical variation.
  - Can spatial patterning in handaxe morphological preferences be identified in MIS 9 Britain? All but one site in Roe's Group I and III were situated on the river terraces of the Thames or its tributaries. By expanding both the number and geographic range of sites, this study hopes to determine how varied morphological preferences were in the MIS 9 interglacial. Likewise, patterns identified in MIS 9 typology have mostly focussed on the Thames or Thames tributaries (e.g., Wymer 1968; Wenban-Smith 2004). There is a suggestion that the characteristic features of the Thames are not universally present in the southwest of Britain (Wenban-Smith 2001; Davis et al., 2016; Hosfield et al., 2013a, 2013b), although ficrons and cleavers have also been identified in the Solent region in MIS 9 aged deposits (Roe 1981; Davis et al. 2016), perhaps pointing to greater complexity in that region.
  - Can any potential morphological, typological or technological patterns identified in the MIS 9 handaxe record be linked to the wider world of MIS 9 Britain, particularly in relation to the settlement history of the region?

- Technological innovation.
  - Certain technological attributes have been linked with MIS 9 handaxes, including plano-convex profiles (e.g., Tyldesley 1986), macroscopic asymmetry (Hosfield et al., 2013a, 2013b, 2013c) and *tranchet* removals associated with cleaver types

(Cranshaw 1983; White 2006). Can these, or any other distinctive or novel technological attribute, be identified in the selected MIS 9 handaxe assemblages?
    - Can an analysis of the symmetry, technology, design, and workmanship of MIS 9 handaxes be integrated into the ongoing debate as to the social 'meaning' of the handaxe in the run-up to the Lower – Middle Palaeolithic transition and the inception of truly Neanderthal behaviours such as technological diversification, curation of tools, and the emergence of geographically and temporally restricted technological practises (Scott 2010; Mathias et al., 2020)?

- Other technocomplexes.
    - Can handaxes be related to the occurrence of the other technocomplexes (the Clactonian and proto-Levallois) in MIS 9? The tripartite succession of lithic technologies is one of the most remarkable elements of the MIS 9 interglacial, but the relationship between each successive technocomplex is unclear in both spatial and temporal terms. Levallois technology has been suggested as being 'immanent' within Acheulean handaxe manufacture, leading to its independent invention in multiple times and places (Bordes 1971b; White & Ashton 2003). Evidence of this may be sought through identifying, for example, the occurrence of handaxes made on flakes and the co-occurrence of handaxes with Levallois and proto-Levallois technology within MIS 9 deposits. This concluding thread of discussion will draw on the findings of the recently completed study into non-handaxe technology in MIS 9 by Rawlinson (2021).

1.4. Structure.

Chapter two provides a theoretical framework for the study, based on a review of relevant literature. To begin, attention is given to the geological framework which has been crucial to determining both relative and absolute ages for Quaternary deposits, in particular terrace modelling which has allowed archaeologically rich fluvial deposits to be tethered to Marine Isotope Stages. The discussion then turns towards the key debates surrounding the handaxe, beginning with a brief summary of our understanding of hominin phylogeny followed by a more in-depth discussion of the function of the handaxe. Following this, the oft cited (and often contentious) hypotheses regarding the possible social resonance of the handaxe will be considered. The focus then shifts to MIS 9, its environments and technological succession.

Finally, an overview of the criteria for the selection of sites for this study will be provided, leading into chapter three.

Chapter three will summarise the history of research at the sites considered in this study, arranged by region, including descriptions of the geological context of the artefacts (where known) as well as an overview of previous observations made of the artefact assemblages themselves. Sites will be divided as follows, according to river catchment: (6.1) Lower Thames and London, (6.2) Middle Thames, (6.3) Upper Thames, (6.4) Wey, (6.4) Kentish Thames tributaries, (6.5) Great Ouse, (6.6) Little Ouse and East Anglia, (6.7) Solent catchment.

Chapter four explains the methodologies used in this study, with an explanation of which questions may be answered by the data acquired.

Chapter five presents morphometric, typological, technological and symmetry results from each site and a short analysis of data according to Roe's (1968a) methodology, which will allow morphometric groups to be identified. Chapter five is supplemented by full data tables and graphs presented in Appendices I – III.

Chapter six discusses the results presented in the previous chapter through a regional geographical lens, summarising features of commonality and variation between sites, and drawing in evidence from other potential MIS 9 sites in the area. In so doing, key questions of spatial patterning may be addressed.

Chapter seven addresses the question of temporal patterning, first looking for overarching (decamillennial scale) patterns present across all sites. This includes a more detailed and rigorous analysis of the suggested chronologically restricted types (ficrons and cleavers) as well as the newly identified chronological significance of hypertrophic forms. The discussion will then progress to the more speculative task of identifying temporal patterning at the sub-MIS (millennial) scale by attempting to construct a chronological framework from the handful of robustly dated, reliably collected handaxe assemblages available for study.

Chapter eight assesses symmetry in MIS 9 handaxes, discussing the results of the FlipTest symmetry analysis before considering asymmetrical technological features present on the studied handaxes, focussing particularly on ergonomic or prehensile features. These include macroscopic asymmetry, retained areas of cortex which may have had ergonomic function, and oblique blunting of the tool at the butt (all of which could be seen as primitive 'backing').

Chapter nine considers the possibility of systematic resharpening of handaxes in MIS 9, particularly in the production of distinctive handaxe forms (the cleaver, ficron and plano-convex ‘Wolvercote-type’ handaxe).

Chapter ten will synthesise the discussions outlined above with the recent companion work completed by Rawlinson (2021) and White & Bridgland (2018) to produce a composite overview of the archaeology of MIS 9 and a wider view of the Lower – Middle Palaeolithic transition in Britain and Europe.

Chapter eleven will offer a brief summary of the thesis along with concluding remarks, and suggestions for future research priorities.

1.5. Scope.

Work on the Lower Palaeolithic is in many ways ‘an exercise in generalisation’ (Hopkinson 2005). Consequently, studies of the Lower Palaeolithic have often fallen into a ‘top-down’ view, where large-scale social and cultural structures mask the actions of the individual (e.g., Roe 1968a). The alternative approach, a ‘bottom up’ view where the mark of the individual on society and culture is explored through lithic technology at the expense of the ‘bigger picture’ has only been attempted relatively recently (e.g., Gamble 1999; Foulds 2010). This study necessarily follows the former strategy in large part. The assemblages included in this study are overwhelmingly the product of fluvial aggradations which represent the accumulated material culture of extended geographical areas and chronological spans; none could truly be said to be *in situ* and few even approach it. Furthermore, the vast majority of handaxes in the study were collected before 1960 by amateur collectors who rarely recorded stratigraphic provenances and often gave only the most general of horizontal provenances (*personal observation*; Harris et al. 2019; Taylor 2019). The principal methodologies used in this study – those of Roe (1968a) and Wymer (1968) – act to obscure individual designs or idiosyncrasies within larger morphometric or typological averages and ranges. The benefit of these methods is that they provide a tried and proven means of comparing large numbers of handaxes across numerous sites, in turn providing a window to larger scale trends in handaxe morphology, typology and technology. That said, the actions of the individual will be considered where possible, for instance on rare occasions where there are primary or near-primary context artefacts with secure provenances, where exceptionally high degrees of symmetry or workmanship are apparent, or where idiosyncratic or extravagant design is in evidence.

Chapter Two: Theoretical Framework.

2.1. Introduction.

This chapter is intended to provide a discussion of the scientific foundation for the present study, reviewing the historical debates surrounding Quaternary geology, hominin evolution and lithic technology in the Middle Pleistocene. In doing so, the results of the present study may be couched in a wider ongoing debate as to the 'meaning' of the handaxe and the nature of the Lower – Middle Palaeolithic transition. Equally importantly, this chapter will highlight the uncertainty surrounding many of these issues, which must be acknowledged when selecting sites for study, and when interpreting data.

2.2. The long glacial chronology.

The present chronology of the late Lower Palaeolithic is built on the correlation of terrestrial deposits with the marine isotope (MI) record. The MI record tracks changes in oxygen isotope ratios as preserved in foraminifera which acts as a proxy for global ice volume and thus, for temperature (Shackleton and Opdyke, 1973; Bassinot et al., 1994; Lisiecki & Raymo, 2005). Prior to this, a shorter glacial chronology was accepted in Europe, which recognised only three Middle - Late Pleistocene interglacial periods (e.g., as posited by Mitchell et al., 1973). These were, in the British terminology, the Cromerian, the Hoxnian and the Ipswichian (Mitchell et al., 1973; Stringer 2011). It had long been suspected that this chronology was compressed (e.g., by Roe 1968a), but it was not until the MI record provided a framework of numbered Marine Isotope Stages (MIS) that headway was made in resolving the problem. The early Amino Acid Racemisation (AAR) research of Bowen et al., (1989) accommodated four Middle – Late Pleistocene interglacials, in agreement with the novel MI record which evinced two additional interglacials. These were previously unrecognised in the British terrestrial record, in part due to the similarity of the pollen signature between the MIS 11 and MIS 9 interglacials which were conflated into a single 'Hoxnian' signature (Bowen et al., 1989; Thomas 2001; Roe et al., 2009). From these starting points, advancements in mammalian (e.g., Currant 1986, 1989; Currant and Jacobi 2001; Schreve et al., 2001) and molluscan (Keen 1990, 2001; Preece 1995, 2001) biostratigraphy strengthened the case for a longer chronology, which ultimately allowed river terrace models, and long profile terrace correlations, to be produced (see below). An MI curve, showing both major stages and sub-stages from MIS 15 to the present day, is shown in Figure 2.1 (from Railsback et al., 2015).

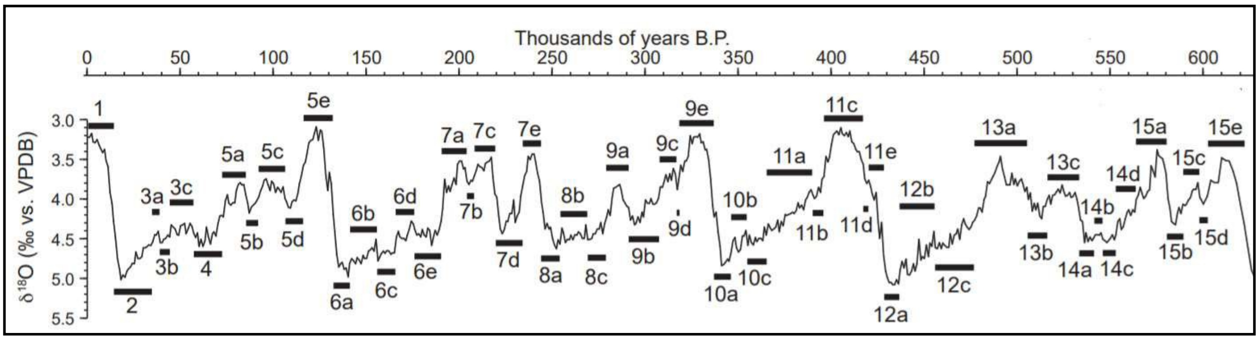


Figure 2.1. A Marine Isotope curve, showing lettered sub-stages, covering the past ~600ka. This curve was generated from the LR04 marine stack, with ratios calculated against the Vienna Pee Dee Belemnite (VPDB) reference sample; figure after Railsback et al., (2015), Fig. 4.

The correlation of MI stages with terrestrial deposits, and particularly fluvial terraces, ultimately allowed Bridgland & White (2014, 2015; White et al., 2018) to reappraise Roe's morphometric groups in terms of chronological patterning. The models which allowed this correlation are outlined below.

2.3. River terraces and MI stages.

River terraces are geomorphological 'staircase' features formed of roughly flat benches connected by bluffs which descend in altitude towards the main river channel. The terraces of the Thames are central to this study, partly because many of the sites in question are situated in the Thames basin, but also because much of the theoretical framework on river terraces was developed using the Thames as a model (Bridgland 1994, 1996, 2006; Maddy 1997; Maddy & Bridgland 2000). Whereas less well-studied terraces are often given simple alphabetical or numerical designations, the Thames terraces have unique names based on type localities. These names differ between the lower, middle and upper reaches of the Thames, although the lower and middle Thames terraces can now be correlated with sufficient confidence that they are often referred to as single features (e.g., the Boyn Hill/ Orsett Heath terrace, and the Lynch Hill/ Corbet's Tey terrace; Bridgland 1994). A brief review of the history of research into the Thames terrace stratigraphy is necessary to correctly interpret historical publications, which lacked both a consistent terminology and a shared understanding of the mechanisms of terrace formation. The identification of the Lynch Hill terrace is of particular importance, as the deposits of this feature are a key source of MIS 9 handaxes. The definition of the current Lynch Hill terrace was formed in large part from observations made in the Middle Thames basin, particularly at the key sites of Furze Platt and Iver. Whitaker (1889) identified three Middle

Thames terraces, the highest of which was subsequently divided into two terraces by Treacher & White (1909). Their 'High Terrace' was represented by a pit near Furze Platt church, now identified as Boyn Hill terrace deposits, whilst their 'Low Terrace' was represented by Furze Platt (Cannoncourt Farm Pit). Warren (1926, 1933) concurred with Treacher and White in recognising the gravels at Furze Platt (Cannoncourt Farm Pit) as being distinct from the Boyn Hill and Taplow terraces. He added the artefacts found at Furze Platt to his 'Grays Inn Lane Group' but recognised the gravels themselves as the 'Furze Platt Stage'. Warren (1942) correlated the Furze Platt deposits with implementiferous gravels at Stoke Newington and Leytonstone (both now considered to be contemporary to Furze Platt) and also the Swanscombe Lower Gravel, Grays and Clacton (now considered to be earlier aggradations). Concurrently, Lacaille (1940) expanded on this scheme, providing elevations for the terraces identified in the Middle Thames and locating his 'Lower Boyn Hill' terrace on both sides of the Thames. King & Oakley (1936) identified a distinct terrace between the Taplow and Boyn Hill terraces at Iver but did not correlate it with the terrace at Furze Platt on the grounds of the latter site lacking the Levallois technology found at the former. They interpreted both the Lynch Hill and Boyn Hill terraces as having formed as a single unit over a stepped erosional surface, and therefore of contemporaneous age.

Hare (1947) correlated the Furze Platt and Iver gravels and was the first to coin the term 'Lynch Hill Formation'. Gibbard (1985) followed Hare's scheme, suggesting that the Levallois technology identified at Iver occurred in the overlying Langley Silt Complex loess and therefore post-dated the fluvial terrace deposits. Corroborating these schemes, Roe (1968, 1981) identified morphological similarities between handaxes at sites from both north and south bank Lynch Hill sites, suggesting a Hoxnian (*sensu latu*) age.

In tandem with the identification, correlation and dating of the Thames terraces described above, generic models of river terrace formation were being developed. Nick-point erosion, a process where the lowering of the base-level through marine regression, was thought to be a major cause of terrace formation through progressive downstream-to-upstream downcutting of the river channel (Begin et al. 1981). However, the effect of nick-point erosion was found to attenuate upstream and therefore could not explain the pronounced middle and upper reach terraces found in large river systems such as the Thames. Earlier models had some success in explaining this, combining eustatic influences in the lower reaches and climatic influences in the middle and upper reaches (Zeuner 1945).

Building on these ideas, D.R. Bridgland linked the development of the Thames terraces to climatic fluctuations relating to Milankovitch cycles and thus directly to the glacial chronology established by the MI record (Milankovitch 1941; Bridgland 1994). This model has been refined and expanded multiple times, but the core tenets remain the same (e.g., Bridgland 1994; Bridgland & Allen, 1996; Maddy & Bridgland 2000; Bridgland 2000; Maddy et al. 2001). A six-stage version of this model is described below in table 2.1 and shown schematically in figure 2.2.

Table 2.1 A six stage model of climatically driven river terrace formation (Bridgland 1994; Maddy et al., 2001; Bridgland & Maddy 2005)

Phase	Timing and climatic conditions	Regime	Channel type	Description (Maddy et al., 2001; Bridgland & Maddy 2005)
Phase 1	Late Glacial, warming.	Incision and erosion.	Single thread.	Surface uplift following the cold stage promotes incision. Warming conditions prompt the regrowth of vegetation, stabilising slopes and limiting sediment supply. Volatile air and ocean circulation over the North Atlantic may lead to increased rainfall which, when combined with glacial and permafrost meltwater, leads to frequent and severe flooding, exacerbating incision.
Phase 2	Early Interglacial, warming.	Aggradation in the lower reaches.	Single thread.	Phase 1 incision creates accommodation space; transport of sediment (including previous terrace gravels) results in lag gravels in the upper reaches and thick gravels deposited in the lower reaches.
Phase 3	Interglacial, warm	Stable, limited aggradation	Single thread	A thin veneer of interglacial deposits are lain down by floods, and as channel sediments.
Phase 4	Late Interglacial, cooling	Unstable, erosion	-	Climatic deterioration leads to increased flood frequency and magnitude, leading in turn to a short erosional phase.
Phase 5	Late Interglacial / Early Glacial, cooling	Aggradation associated with bed scour (erosion)	Multichannel	Decrease in vegetation as a result of deteriorating climate leads to slope instability; sediment supply increases rapidly, leading to a change from a single channel to multichannel system which forms a wide braided plain. Some scouring of the bed occurs in places, removing pre-existing sediments.
Phase 6	Glacial, cold	Stable, short	-	The river adopts an Arctic nival (snowbound, annual) flooding regime, where occasional flooding redistributes existing sediments.

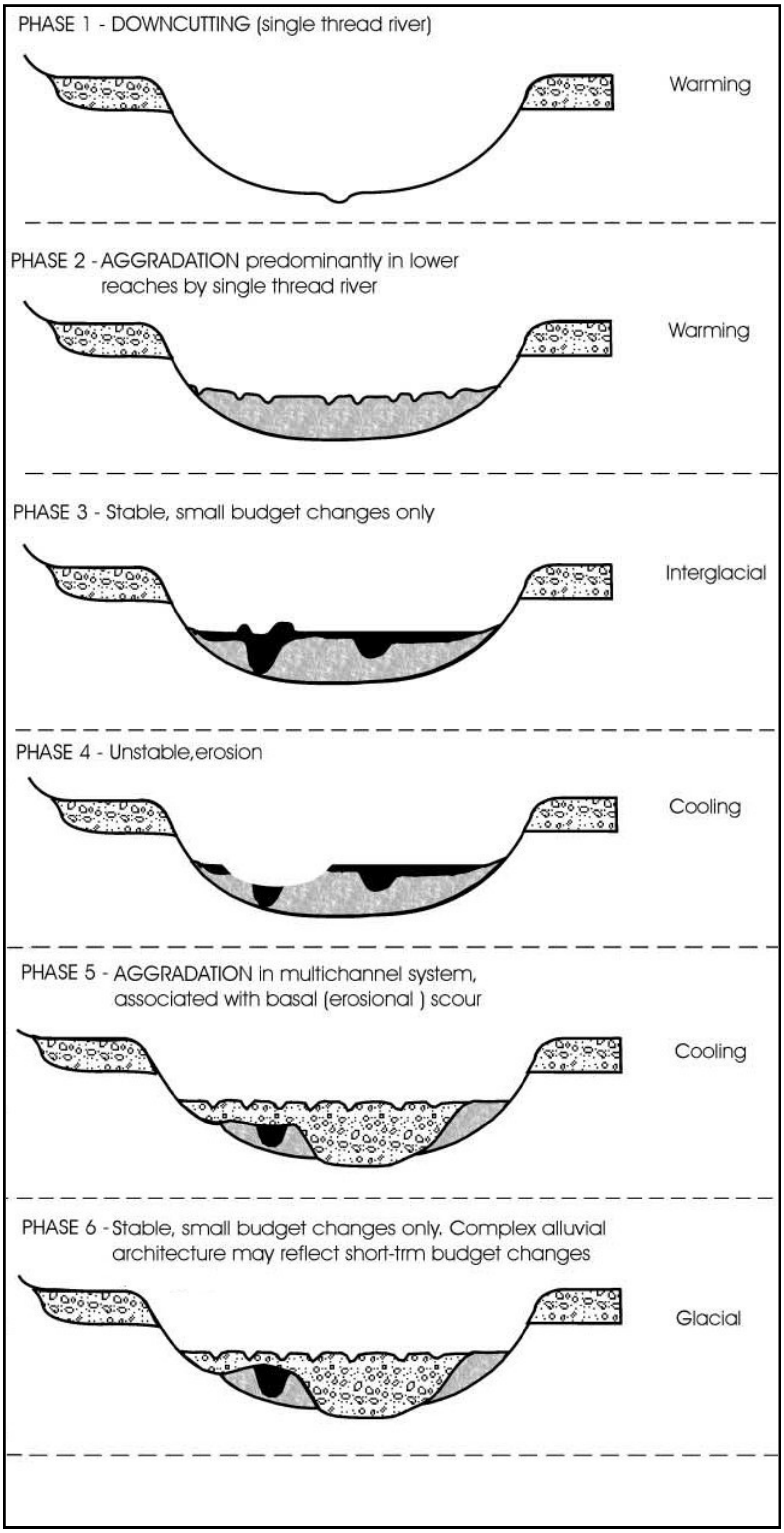


Figure 2.1. A diagram outlining the six-stage model of terrace formation (after Bridgland & Maddy 2005).

In short, the step-like formation of river terraces is the result of periods of punctuated incision into the bedrock below the level of the previous terrace bench level, followed by periods of aggradation, set against continuous uplift (Bridgland & Westaway 2008). The south of England is tectonically inactive (MacGregor & Green 1983), and so it has been suggested that rheological processes drive uplift. This idea was advanced by Westaway et al. (2002), who suggested that onshore uplift occurred as an isostatic response to the offloading of sediment mass from onshore to offshore regions through fluvial erosion, transportation and deposition. Glacio-eustatic rebound following severe glaciation has also contributed to the vertical incision of the Thames, although the effect of this rebound has not yet been fully resolved (Maddy & Bridgland 2000). The punctuated incision and aggradation outlined above occur in close synchrony with the 100ky. Milankovitch cycle, particularly after around 1Ma. when the 100ky. cycle increased in severity (Westaway 2002; White et al., 2017). Each terrace level therefore generally represents one glacial-interglacial cycle. This is true of the Thames and most of the other major rivers of south-eastern England and indeed north-west Europe (Bridgland & Maddy 2002; Bridgland & Westaway 2008): the Solent is an exception to this rule, where ‘double’ terraces per glacial-interglacial cycle are common (perhaps resulting from the proximity of the Solent system to the Atlantic, resulting in greater sensitivity to climatic fluctuation) (Westaway et al., 2006; Bridgland & Westaway 2008).

Due to the close link between Milankovitch cycles, glaciation and the MI record, climatically driven terrace formation modelling allowed the correlation of terrestrial sediments to stages identified in the MI record (Bridgland & Harding 1993a; Bridgland 1994), which was ultimately supported by biostratigraphic correlations (Bridgland & Schreve 2001, 2004; Schreve et al., 2002; Roe et al., 2009) and absolute dating of deposits by an ever-expanding battery of methods (Bowen et al., 1995; Briant et al., 2012; Marshall et al., 2020). The improved dating of terrace deposits has in turn allowed refinement in dating deposits by AAR. This method, based on the rate of decay of amino acids in the opercula of the aquatic mollusc genus *Bithynia*, is a valuable relative dating tool which has allowed the dating of terrace deposits outside of the Thames through comparison with AAR ratios from the Thames deposits of known age (Penkman et al., 2011, 2013; Briant et al., 2012). Bridgland’s model has been applied to other river systems in Britain and further afield (e.g., Bridgland et al. 2004; Bridgland & Westaway 2008).

The application of climatic terrace models to the previously established succession of terrace levels allows the relatively robust dating of Thames river terraces to an MI (decamillennial) scale. The Thames was diverted into its current southerly course by the extensive Anglian (MIS 12) glaciation (Gibbard 1977, 1979; Bridgland 1988). As a result, the highest terrace is generally the Black Park terrace, thought to have formed in MIS 12, although older terrace deposits exist from the pre-diversion Thames. Each ‘step’ down the terrace staircase represents the next most recent glacial cycle, as shown in Figure 2.3.

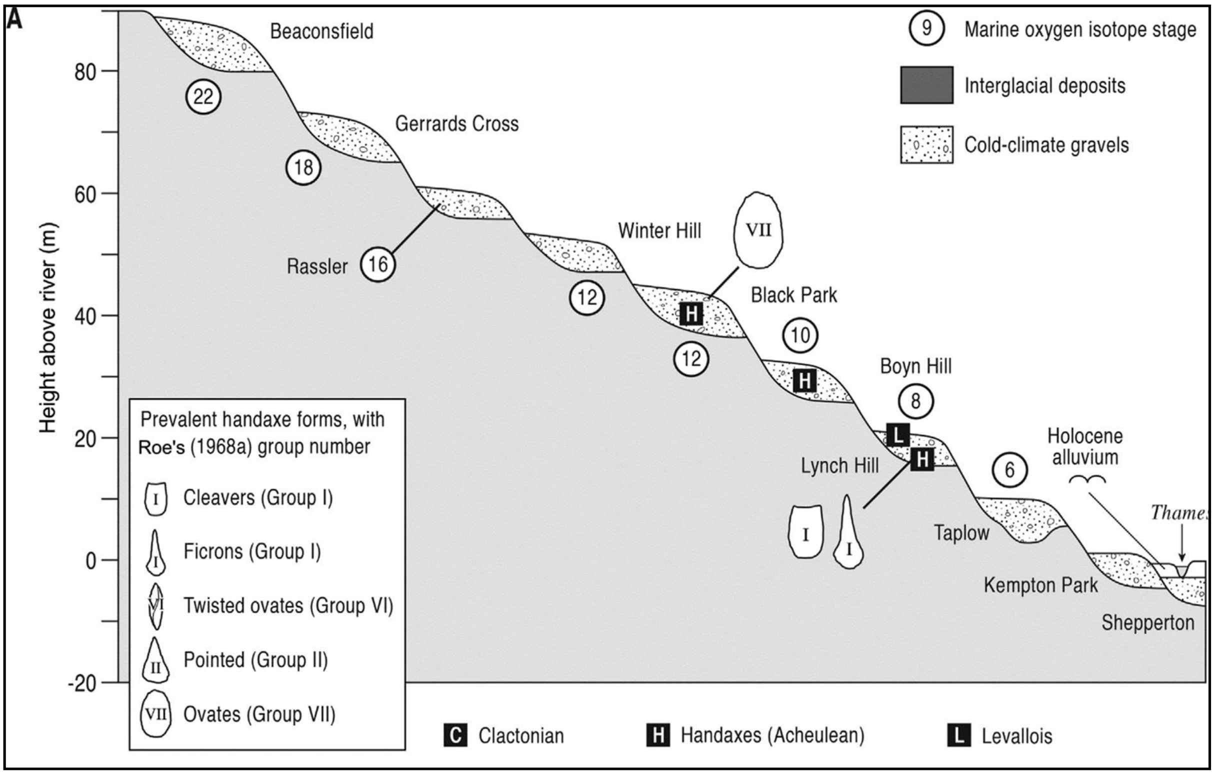


Figure 2.3. A schematic representation of the Thames terraces showing MI stages and key archaeological characteristics where relevant. From Bridgland & White (2015), fig. 1, p. 625, after Bridgland (2006, 2010).

A variety of post-depositional features have been observed in the Thames fluvial deposits. These include shearing, fracturing and perturbation of primary bedding structures due to cold-climate (collectively described as cryoturbation) or due to the dissolution or slumping of carbonaceous minerals (for example the solution pipes or 'badmen' at Furze Platt, Harding et al., (1991)). The fluvially formed parts of the Thames terraces are often capped by the solifluction deposits, which can be explained by downslope slumping of higher-terrace material onto lower terraces. This subsiding material is generally formed from the solution and brecciation of the underlying chalk bedrock and may contain reworked artefacts. Furthermore, aeolian periglacial loess forms a discontinuous spread across Thames terraces, often referred to as 'brickearth', which post-dates initial terrace formation (Gibbard et al., 1987). These post-depositional features are therefore important when interpreting artefact assemblages with unclear provenances, as will be seen in the site backgrounds chapter (chapter three).

2.4. MI sub-stage correlation.

The MI record shows both major, decamillennial fluctuations in climate (MI stages) and smaller scale, millennial scale variations – these are MI sub-stages, which have been variously described using lettered (Railsback et al., 2015) or numbered (e.g., Bassinot et al., 1994; Piva et al., 2014) designations. The former system is preferred here. Recent advances in the dating of Quaternary deposits have allowed MI sub-stage ages to be suggested for a number of Lower Palaeolithic sites in Britain, generally where the artefacts are associated with fine grained interglacial sediments (e.g., Davis & Ashton 2019; White et al., 2019). However, as will be outlined in the following section, environmental sites which archive multiple sub-stages are unusual in MIS 9, and rarely associated with artefacts.

It is much more difficult to suggest reliable MI sub-stage correlations for fluvial gravels, which tend to lack the kind of environmental evidence which facilitates precise dating. Bridgland's model suggests that the initial terrace-forming incision occurs at the terminal (warming) limb of a glacial phase. For the Lynch Hill terrace, this would be the MIS 10/9 transition. The main body of material found on the Lynch Hill terrace is more difficult to date than the initial downcutting event, however. This is because the two main depositional phases (phase 2 and phase 5) are difficult, if not impossible to distinguish between in the absence of intervening interglacial (phase 3) deposits (Hosfield 2011a). These interglacial deposits are common in the Lower Thames, but much rarer in the artefactually rich Middle Thames, making sub-MIS correlation of key sites such as Furze Platt and Baker's Farm difficult. Wenban-Smith (2004) acknowledged the difficulty of resolving the age of the terrace to a greater degree than simply 'MIS 10 – 8' but forwarded the idea that the 'classic' Lynch Hill terrace, as represented by Cannoncourt Farm Pit and Baker's Farm Pit, 'might date wholly to MIS 8'. This view was supported by McNabb (2007), who attributed the development of the 'main body' of the Lynch Hill terrace to the interglacial – glacial (MIS 9/8) transition (phase 5), also noting that implements found on the surface of the gravel might represent a different stage to those found within it. Only a handful of the key Acheulean sites included in this study can be assigned to MI sub-stages (or more generally to the earlier or later parts of the interglacial) with any confidence – this will be **discussed fully in the following chapter**.

2.5. Palaeoenvironments and Palaeoclimate in MIS 9.

The retreat of the extensive Anglian (MIS 12) glaciation produced conditions conducive to lake formation in the following (MIS 11) interglacial. These fine-grained lacustrine sediments preserved a wealth of environmental evidence, particularly in East Anglia, which allowed a detailed pollen profile to be constructed (West 1956; Turner 1970). This in turn ultimately allowed both sub-stage age attributions and the tethering of environmental to archaeological data in MIS 11 (Ashton et al., 2008; Candy et al., 2014; White et al. 2019; Ashton & Davis 2021). The less extensive MIS 10 glaciation did not lead to widespread lake formation in MIS 9 (Thomas 2001). This is reflected in the depositional environments of the archaeological sites which comprise this study, which are overwhelmingly fluvial in nature and are generally impoverished in environmental evidence. Roe & Preece (2011) pointed out that whilst the interglacial deposits (Bridgland's phase 3) of the middle and upper reaches of the Thames are typically thin and fragmentary remnants of channel-fills or floodplain aggradations sandwiched between much more extensive cold climate gravels, the interglacial deposits of the Lower Thames in Essex are thicker and laterally more extensive. This, combined with the fact that the interglacial channels of the Lower Thames can be correlated by molluscan biostratigraphy and AAR to the main Thames terraces, makes the lower Thames a potentially interesting area for resolving questions of substage climatic variability and sea-level change in MIS 9. Evidence from interglacial channel-fills on the Southend Peninsula show a major MIS 9 marine transgression of 5 – 7m O.D. occurred early in the interglacial (Roe 1999; Bridgland et al., 2001), which might be attributable to the peak-interglacial MIS 9e substage. A wide range of biostratigraphic evidence preserved at the key environmental sites of Barling, Shoeburyness and Cudmore Grove suggests that the fully interglacial part of MIS 9 (probably MIS 9e) was comparable in temperature to the present day, with mean July temperatures around 2^{o}C warmer than present and slightly cooler winters (Roe et al., 2009; Ashton 2017). Warmer parts of the interglacial, including the MIS 9e sub-stage, probably had closed forest environments (Birks & Birks 2004; Roe et al., 2009), whilst cooler climate may have led to coniferous forests and more open environments. Pollen data from offshore Portugal dated to MIS 9 suggests that cycles of forested and open environments occurred during alternating warm (MIS 9e, 9c, 9a) and cool (MIS 9d, 9b) sub-stages (Roucoux et al., 2006), and it is possible – likely even - that this cyclical variation in forestation also occurred in southern England.

Regardless, it is difficult to associate the artefactually rich (but palaeontologically impoverished) sites outside of the Lower Thames with environmental sites such as Barling, Shoeburyness and Cudmore Grove which generally lack archaeology (Bridgland et al., 2001; Roe et al., 2009, 2011; Ashton 2017). Where palaeoenvironmental evidence can be directly associated with handaxes – particularly at Stoke Newington, Purfleet and Wolvercote – the evidence will be outlined **in the following chapter**.

2.6. The Human Lineage

The Lower Palaeolithic is the earliest and longest archaeological period, beginning with the first evidence of tool production at the Oldowan site at Ledi-Geraru, Ethiopia estimated at 2.58Ma (Braun et al., 2019) and concluding with the widespread replacement of the Acheulean with Levallois technology at around 300Ka (Ashton et al., 2015). The period was one of remarkable diversity in the homin lineage, with several species co-existing in different regions for much of the period. In the case of later hominins - *Homo sapiens*, *H. neanderthalensis*, and *H. denisova* – there is evidence of interbreeding (Reich et al., 2011; Neves & Serva 2012; Villanea & Schraiber 2019). A full discussion of human evolution is beyond the scope of this study. However, an overview of the current state of the topic is given below.

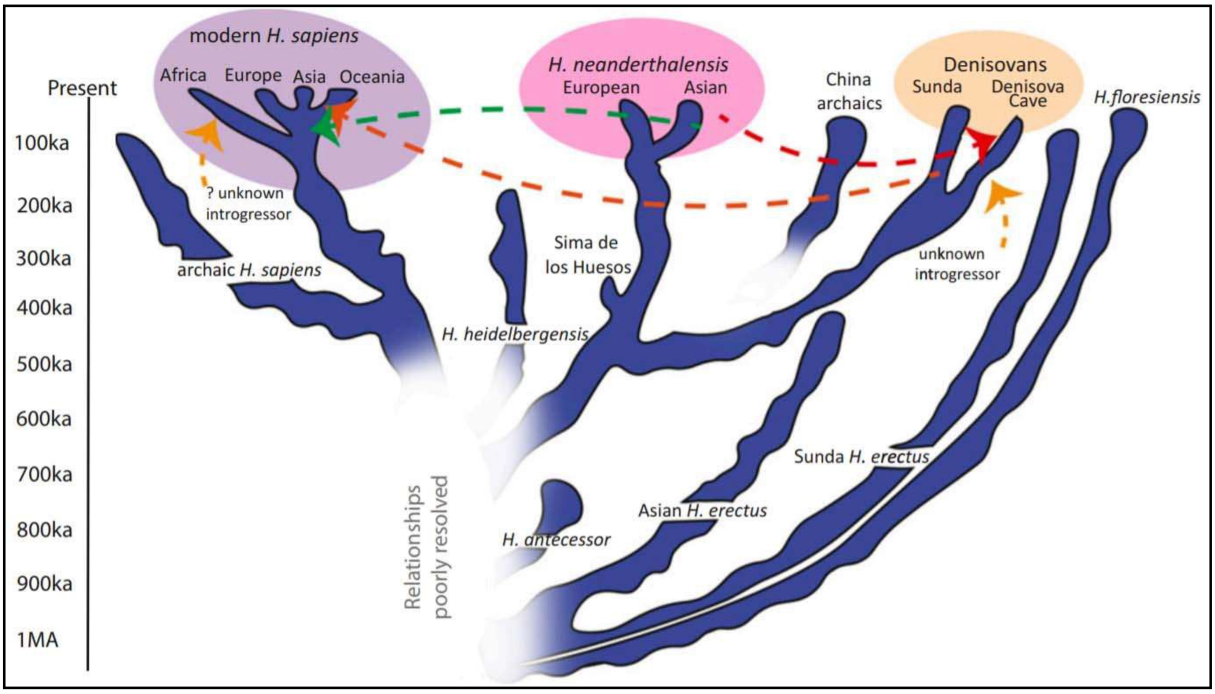


Figure 2.4. An evolutionary tree of hominins from c. 1MA to present, showing the diversity of species extant between c. 500ka and 100ka. From Stringer & Barnes (2015)

Despite the diversity of species shown in more recent estimations of the human evolutionary tree, as shown in figure 2.4, the artefactual residues left behind by species after around 500 Ka are difficult, if not impossible, to distinguish from one another. *H. erectus* (in its various forms), *H. heidelbergensis* and *H. neanderthalensis* are all thought to have produced flakes, cores and handaxes (Kohn & Mithen 1999; Mithen 2003; de la Torre 2016), and no clear technological differences between the products of the different species is apparent except for the much later Late Middle Palaeolithic (Neanderthal) Mousterian of Acheulean Tradition (MTA) handaxes. That said, any link between archaeology and hominin species in the Lower Palaeolithic could well be obscured by the paucity of hominin fossils, especially in Europe. This is nowhere clearer than in Britain, where the *entire* Lower Palaeolithic hominin fossil record comprises three much-celebrated skull fragments from Swanscombe, Kent, dated to MIS 11 (Ovey 1964; Bridgland 1994), and two teeth and a tibia from Boxgrove, West Sussex dated to MIS 13 (Pitts & Roberts 1997; Roberts et al., 1999). Lithic artefacts and preserved footprints at Happisburgh 3, Norfolk (dated to MIS 25 or 21) constitute ichnofossils which may be – tentatively – ascribed to *H. antecessor* (Parfitt et al. 2010; Ashton et al. 2014; Groote et al., 2018; Wiseman et al., 2020). Roksandic et al., (2017) summarised the scale of the debate surrounding the taxonomy of these sparse remains: the Swanscombe skull fragments (the closest fossil hominin remains in chronological terms to the MIS 9 interglacial) have been described variously as 'pre-*sapiens*' (Boule & Vallois 1957), 'Neanderthal-like' (Santa Luca 1978), 'Neanderthal transitional form' (Wolpoff 1980), 'early pre-Neanderthal' (Dean et al., 1998), 'primitive Neanderthal' (Hublin, 1998; Stringer & Hublin, 1999), *H. neanderthalensis* (Klein, 1999) or *H. heidelbergensis* (Smith 2013, preferred by Kent County Council's official literature). 'Hominin' is primarily used in this study to side-step the taxonomic debate, and as an acknowledgement that the differences in terminology are not relevant to the research presented here given the complete absence of human fossils from the period. Perhaps a more interesting question would be whether the archaeology of the British Lower Palaeolithic (or indeed, the MIS 9 interglacial) was produced by a *single* species - both MIS 11 and MIS 9 feature successions of technological modes which could just as easily be ascribed to the differing behaviours of distinct species as to distinct cultures within one species – but there is little enough evidence to fuel this debate one way or another.

2.7. Handaxe function.

It was the sincere (but unfulfilled) ambition of the author to avoid what are essentially semantic discussions about what a handaxe *is*, or whether they should be called handaxes at all given that the tool was probably not analogous in its function to a modern axe (or at least, not exclusively). The term 'biface' is preferred by many European researchers, and whilst this term avoids guessing at function, it does not differentiate between other bifacially made tools from later prehistory and does not encompass unifacial handaxes or trifacial picks which are sometimes part of the Acheulan technocomplex (Moncel et al., 2015). 'Large Cutting Tool' is a generic, if terse, alternative which subsumes bifacial and unifacial handaxes, cleavers and picks, and places emphasis on the role of the tool as a support for a cutting edge (Sharon 2007; Moncel et al., 2015; Garcia-Medrano et al., 2019). 'Handaxe' is preferred here simply because it is the standard British terminology, but it is used in the most inclusive sense. For example, a cleaver (metrical or typological) is treated as just one part of a continuum of handaxe forms (White 2006), rather than a distinct tool.

A handaxe is a tool formed from *façonnage*, meaning that it is the residual product of a knapping sequence (a core tool), with two distinct faces separated by a cutting edge (Roche 2005; Gowlett 2006a; Corbey et al., 2016; Garcia-Medrano et al., 2019). This definition could equally apply to later prehistoric tools from North America and Australia, which have no relationship with the Lower Palaeolithic handaxe; as such, Wynn & Gowlett (2016) suggested six additional 'design imperatives' under the acronym GLOBFELTS (summarised in table 2.2).

Table 2.2. The six design imperatives ('Globfelts') of Wynn & Gowlett (2016).

GLOBFELTS (Wynn & Gowlett 2016)	**Description.**
Glob-butt	An ergonomic notion which refers to the mass of the handaxe which comfortably fits in the hand, generally concentrated towards the butt.
Forward extension	The handaxe was designed to provide leverage and a long cutting edge whilst keeping the centre of gravity in the users grasp; this generally resulted in thinning towards the tip.
Support for working **e**dge	The handaxe was primarily simply a support for a cutting edge, which was produced through knapping material from the margins (often producing a lens shaped cross section).
Lateral extension	If forward extension was too narrow, the handaxe may be prone to twisting; lateral extension is another ergonomic function to prevent this.
Thickness adjustment	The weight of the handaxe could be managed by adjusting thickness through removal of mass from the faces, although this affected edge angles. Crucially, Wynn & Gowlett (2016) suggested that 'thicker handaxes had different functional characteristics than did thinner, lighter ones'.
Skewness	Knappers may have slightly biased the shape of their handaxes according to their preferred handedness.

The physical function of the handaxe is one of the less contentious aspects of the tool, being regarded as a heavy-duty butchery tool by most modern researchers. This is based on the association between handaxes and butchery sites (e.g., at Boxgrove, Roberts et al., 1999), although such sites are themselves relatively uncommon compared to secondary fluvial aggradations. Use-wear analysis showing striations caused by meat and bone processing further supports the idea of the handaxe as a butchery tool (e.g., Mitchell 1996; Solodenko et al., 2015), and experimental studies have demonstrated the suitability of the handaxe for a range of butchery tasks (Machin et al., 2005, 2007). A more 'general-purpose' function for the handaxe, which may have included digging and even woodworking has been suggested and has been supported to some extent by use-wear analysis which has occasionally revealed a distinctive 'wood polish' on cutting edges (Keeley 1977, 1980; Ohel 1987; Lemorini et al., 2014). More outlandish suggestions, stemming from John Frere's original description of the handaxe as a weapon (Frere 1800), include the idea that the handaxe could function as a projectile or 'hand bolt' (e.g., Jeffreys 1965; O'Brien 1981), or a form of caltrop (Wayman 2010), but these ideas have largely been rejected (e.g., Whittaker & McCall 2001; Iovita & McPherron 2011).

Whilst the experimental work of Galan & Dominguez-Rodrigo (2014) has suggested that small handaxes are more efficient in certain butchery tasks than simple or retouched flakes, previous studies have shown that flakes can themselves be very efficient in processing carcasses (e.g., Schick & Toth 1993), and so the functional advantage of the handaxe over simpler core-and-flake technology is not immediately clear. Further work by Machin et al., (2005, 2007) showed that highly symmetrical handaxes were not significantly more efficient in butchery tasks than less symmetrical examples. In short, the functional advantages conferred by an elaborate, refined and symmetrical handaxe would not seem to justify the effort taken to manufacture them. In the small-scale experimental study of Mitchell (1996), a professional butcher favoured a medium sized ovate handaxe in butchering a deer carcass, but this does not necessarily mean that ovate types were more efficient than pointed types and could simply be down to the personal preferences of the (*H. sapiens*) butcher. Building on the GLOBFELTS design imperatives, which obliquely suggested that handaxes with differing thickness could have different functions (Wynn & Gowlett 2016), Wynn (2020) suggested that lithic technology was produced at two different scales, 'a heavy-duty scale that consisted of one- and two-handed pounding and perhaps heavy slicing and piercing; and a light-duty scale that consisted primarily of slicing with precision grip' (Wynn 2021, 183). This is supported by the recent small scale experimental study by Baber & Janulis (2021), who compared the efficacy of a simple pebble core, a crudely made handaxe ('early Acheulean') and a well-made handaxe ('late Acheulean') in terms of butchery and bone-marrow extraction. They found that the larger, heavier crude handaxe was far more useful for breaking bones; in contrast, the well-made handaxe was more efficient at cutting (butchery) tasks, perhaps hinting at a degree of functional variation between handaxe types and sizes which has not been fully explored. The cleaver, one of the key typologies suggested as being characteristic of MIS 9 assemblages, has often been assumed to have a specific 'heavy duty' function (e.g., Wymer 1968), but the distinctive chisel-ended form of the type as found in Britain and northern Europe may simply represent part of a continuous variation in handaxe form (White 2006). Likewise the ficron, with its distinctive biconcave planform and occasionally prodigious size might be regarded as a 'heavy duty' tool, although at present the type has no well-established *specific* function which would differentiate it from other forms. Functional and ergonomic considerations likely contributed to the observed inter- and intra- site variation in handaxe form to some extent, **as will be argued in the discussion chapter**, but other explanations for variation in handaxe shape are needed.

2.8. Variability in handaxe form.

The variation in handaxe shape between and within assemblages has occupied the attention of Lower Palaeolithic researchers for over a century, but the earliest efforts to understand this variation were hamstrung by the inadequate 'compressed' glacial chronology **outlined above**. Early explanations for variability were influenced by Darwinian evolutionary theory and assumed that handaxes progressed from relatively crude forms to relatively sophisticated, refined, and symmetrical forms over time (e.g., de Mortillet, 1883). Early systems of classification followed suit, placing the same idea of 'evolution' in handaxe form within typological frameworks (e.g., Commont, 1908; Evans, 1897; Breuil, 1932). The typological or descriptive names produced by these frameworks were taken to define both culture and chronology inextricably, such that the relatively crude 'Chellean' must have been both more ancient and more primitive than the 'Acheulean', itself a lesser version of the sophisticated (and more recent) 'Micoquian'. Where a new typology or pattern was identified, it was generally shoehorned into the existing chrono-cultural framework, hence Breuil's (1932) gradation of the Acheulean into multiple numbered divisions. Terminological changes, such as Breuil's attempts to recategorize the 'Chellean' as the 'Abbevillien' based on what he considered to be a more suitable type-locality, only confused the issue further. The idea of linear progression was extended to include other technological modes, with an assumed progression from Clactonian to Acheulean to Levallois noted by Lacaille (1940) at several key Lynch Hill Terrace sites. Bordes (1953; 1961) began to move away from simple unilinear evolutionary models, producing a 'branching' evolutionary tree of handaxe morphology and sophistication (Iovita & McPherron 2011). Roe (1968) and Wymer (1968) began to extricate the idea of Lower Palaeolithic culture from chronological progression altogether, as it was clear from the morphometric groups of the former and the typological scheme of the latter that handaxe 'refinement', in the broad sense, was not strictly dependant on age (although both made some attempt, without great conviction, to fit their observations into the short glacial chronology of the time). Evolutionary ideas were ultimately debunked by the establishment of a 'long' glacial chronology in tandem with better dating of archaeological sites (discussed above) which together showed that no such trend existed – the key ideas which replaced the earlier evolutionary models are discussed fully below.

2.9. The Resharpening Hypothesis.

As 'evolutionary' ideas slipped out of fashion, the variation in handaxe morphology was increasingly addressed by theories regarding the process of their manufacture. McPherron, following Dibble's work on resharpened Mousterian tools (Dibble 1987; Rolland & Dibble 1990), proposed that handaxes would naturally transform from pointed to ovate shapes as they were rejuvenated through a cycle of creation, use, resharpening, and reuse (McPherron, 1994, 1995, 1999, 2000). His methodology, a variation on Roe's (1968) morphometric analysis, focussed on variations in 'tip length' (the length along the major axis above the point of maximum width) as this was the value expected to be most affected by resharpening. By reanalysing Roe's original (1968) data, McPherron (1995) was able to show a correlation between pointed planforms, longer tip lengths and low refinement, and between ovate planforms, shorter tip lengths and higher refinement. He interpreted these correlations as evidence of systematic resharpening of pointed forms into ovate forms, pointing to reductions in both thickness and length as evidence of volume removal, although the link between length and refinement was, by his own admission, less secure (McPherron 1999).

McPherron (2000) argued that the correlation observed between planform, elongation and length showed that Lower Palaeolithic knappers were not attempting to make any particular shape, and in essence had no 'mental template' as to what the handaxe should look like, since shape seemed to vary predictably with size. Even accepting the possibility that this may be explained by the hominin handaxe makers attempting to maintain a particular predefined allometric relationship (e.g., Gowlett, 1984; Gowlett and Crompton, 1994; Crompton and Gowlett, 1993), there appeared to be only a single simple relationship between length and shape and to McPherron the process was cognitively 'passive' (McPherron, 2003; Iovita and McPherron, 2011).

Whilst there is a general acceptance of the *ad hoc* practice of resharpening in the Lower Palaeolithic (evinced by the occasional occurrence of a handaxe fragment which has been resharpened into a new tool (Hosfield et al., 2013c) and by the relatively rare occurrence of handaxe recycling (e.g., Brumm et al. 2019), the resharpening hypothesis as advocated by McPherron has been challenged from several angles. Crucially, refitting elements and partially fashioned roughouts show that refined ovate planforms were produced in the first instance and were not exclusively the product of the resharpening of pointed planforms (Austin 1994; Ashton and White 2003). Ashton and White (2003) pointed out that the mid-point width of pointed types was typically narrower than in ovates, making it impossible to produce the latter from the former; however, Emery (2010) criticised this in turn by showing that the mid-point width would shift during resharpening. This is shown in figure 2.5.

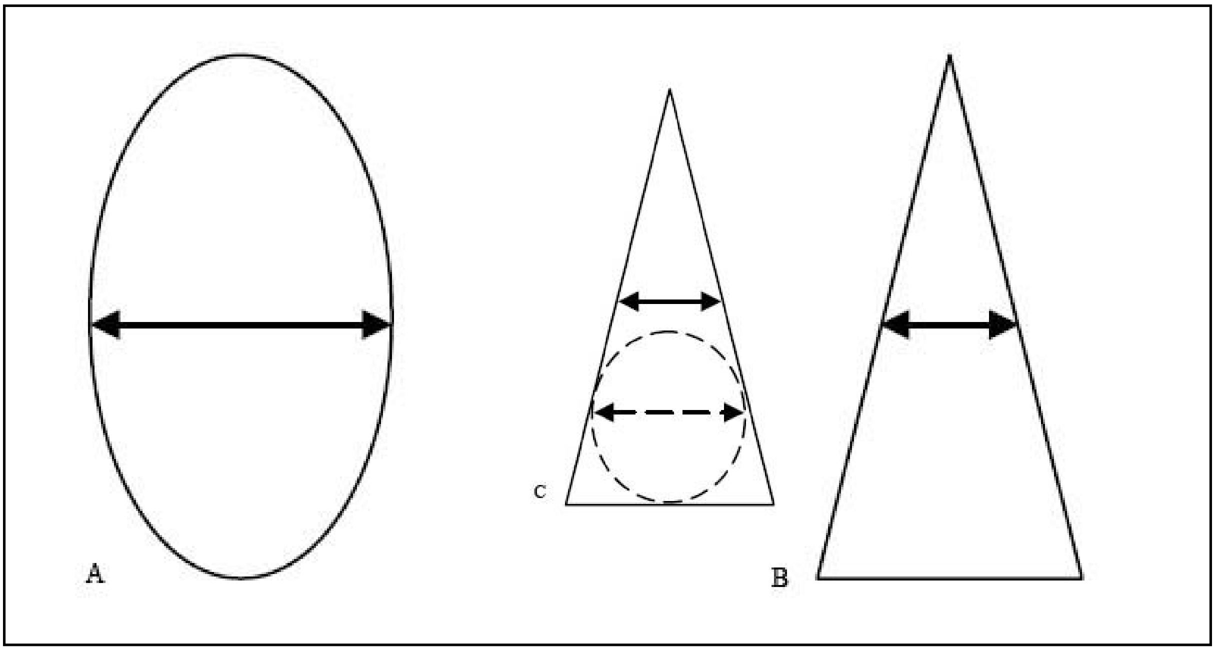


Figure 2.5. Ashton & White (2003) had criticised McPherron's (1994, 1995, 1999) resharpening hypothesis on the grounds that the point of maximum width in ovates (A) was typically greater than that of points (B), making it unlikely that an ovate could be produced from a point. Emery (2010) challenged this criticism on the grounds that the point of maximum width would shift based on the reduction of length; if length were differentially removed relative to width, a (smaller) ovate handaxe could indeed be reduced from a point.

2.10. Raw Material Hypothesis.

An alternative model was presented by White (1995, 1998b), whose raw material hypothesis was based on an analysis of 19 British handaxe assemblages, again using an adapted version of Roe's methodology (Roe 1968a). White suggested that the morphological patterning observed in the British Acheulean was a function of the raw materials which were locally available for tool production. He tested this hypothesis by recording the amount and location of residual cortex to estimate the shape of the flint blanks, following the method of Ashton and McNabb (1994), then determining whether this had an impact on the finished form. He found that between 22-35% of pointed handaxe types had been 'conditioned' by the original blank form, while only 5% of ovate forms were conditioned in this way. The pattern which emerged from the analysis appeared to show that small, elongate flint clasts such as those derived from fluvial gravels were used to produce smaller, narrower handaxes with pointed planforms. Conversely, larger nodular flints derived from chalk were used to produce handaxes with refined ovate planforms. White interpreted this evidence to suggest that, when higher quality raw material permitted, the refined ovate form was 'preferred'.

Whether the blank form 'actively' controlled the form of the finished handaxe, or whether the knapper 'passively' followed a path of least resistance in producing a cutting edge was discussed in White (1998b), but no conclusion was reached.

White (1998b) speculated that the ovate had functional advantages. The central balance and all-round cutting edge may have allowed the efficient use of the entire circumference, factors loosely supported by the butchery experiment of Mitchell (1996). In contrast, the pointed handaxe with its long, straight converging edges and centre of mass towards the butt would not have allowed rotational movement and was therefore potentially reliant on a less efficient 'sawing' motion. Nevertheless, the raw material hypothesis does not imply a functional difference between points and ovates, but rather a case of 'making the best' of whatever local resources were available. The original model accommodated for exceptional cases where primary flints were extremely elongated, for example at Cuxton (Shaw and White, 2003). The raw material hypothesis does not necessarily imply a 'passive' engagement with the raw material, with the knapper's actions controlled by the raw material; rather, it leaves open the possibility that the careful selection of raw material was part of the knapping process, particularly in cases where the selection of raw material for its prehensile qualities, weight and balance would be important (i.e., in the production of pointed types). The model moved away from the notion of traditions, in the sense of Roe's 'pointed' and 'ovate' traditions, and towards viewing the handaxe as a flexible and diverse mental construct (following Ashton and McNabb, 1994). In this model, it is the techniques of manufacturing a sharp edge on the available raw material which were culturally transmitted, and not the overall shape of the handaxe.

The idea of raw material as a constraint on handaxe morphology is in opposition to Holloway's suggestion 'that there is no necessary relationship between the form of the final product and the original material', which he had considered to be one of the key factors of human material culture (Holloway 1969). García-Medrano et al., (2019) concluded that neither raw materials nor resharpening alone could account for the shape of handaxes at Boxgrove; rather, the Boxgrove handaxes were made to a specific mental template. Whilst accepting that raw material undoubtably had some effect on handaxe form, White himself ultimately moved towards the idea that individual design and workmanship (White forthcoming), and normative social tradition (Bridgland & White 2014, 2015, 2018; White 2015; White et al., 2018, 2019; Shipton & White 2020) were more influential in determining handaxe shape than raw material constraints.

2.11. Normative social traditions and chronological patterning in British handaxes.

Roe’s morphometric study analysed handaxes from 38 British Lower Palaeolithic assemblages. Roe’s methodology shared similarities to Bordes’ (1961) earlier scheme and has been widely used since its publication as a means of comparing large groups of handaxes using shape-descriptive indices. Roe’s methodology is central to the present study and is described in full in the methodology and results chapters. Roe identified seven groups of sites which shared morphological characteristics, particularly in terms of their planform shape, elongation and tip shape. The ‘short’ glacial chronology available at the time did not allow Roe to establish chronological patterning within his original groups, although he strongly suspected such patterning was present. Perhaps more significantly, he identified that handaxe groups often occurred at similar river terrace levels.

Improved dating of Lower Palaeolithic sites, combined with an updated ‘long’ glacial chronology, allowed the correlation of fluvial terraces to the MI record (see above). Bridgland & White (2014, 2015, 2018; White 2015; White & Bridgland 2018; White et al., 2018) synthesised these advances with a reappraisal of Roe’s morphometric groups, revealing strong chronological patterning of handaxe morphologies across the British Lower Palaeolithic at the decamillennial (MIS) scale. Their age attributions are shown, with reference to Roe’s original groups, in figure 2.6.

←	Pointed tradition	→	←	Ovate tradition	→
Group I (with cleavers)	Group II (with ovates)	Group III (plano-convex)	Group V (crude, narrow)	Group VI (more pointed)	Group VII (less pointed)
MIS 9–8	MIS 11	MIS 9	MIS 15–13	MIS 11	MIS 13
Furze Platt	Swanscombe MG	Wolvercote	Fordwich	Elveden	High Lodge
Bakers Farm	Chadwell St Mary		Farnham terrace A	Bowman's Lodge	Warren Hill fresh
Cuxton	(Hoxne UI)		Warren Hill worn	Swanscombe UL	Highlands Farm (Black Park Terrace)
Stoke Newington	Dovercourt		(Kents Cavern Breccia)	(Wansunt)	Corfe Mullen
	Hitchin		[Black Park Terrace (worn)]	(Foxhall Road Grey Clay)	(Boxgrove)
	(Foxhall Road Red Gravel)			(Hoxne LI)	
				MIS 13–12	
				Caversham	
				Middle Palaeolithic	
				Shide, Pan Farm	
				Oldbury	

Figure 2.6. Roe's (1968a) morphometric groups, updated with additions from White (2015) in parentheses. Inferred ages added by White et al. (2018). Note that sites which lack robust dating evidence (including Whitlingham and Twydall from Group I) are excluded. Figure from White et al., (2018).

The key characteristics of Roe's Groups are outlined below in table 2.3., synthesised from Roe (1968a, 1981). The patterns identified by Roe and contextualised by Bridgland & White were not a return to earlier 'evolutionary' models, as they were neither predictable nor linearly progressing from crude to refined. Nevertheless, they identified frequently occurring morphologies and typologies within assemblages of broadly similar ages which they related to cultural preferences, probably relating to the colonisation, extirpation and recolonization of hominin groups in Britain (Bridgland & White 2014, 2015; Shipton & White 2020).

Table 2.3. A summary of the characteristic metrical, typological and technological characteristics of Roe's Groups (Roe 1968a), along with the suggested chronological significance of Roe's handaxe groups, after White et al., (2018).

Tradition	Group	Sub-groups	Suggested chronological significance (White et al., 2018)	Key metrical and typological characteristics

Pointed	I (with cleavers)	-	MIS 9-8	Pointed types are common and include ‘extreme’ forms such as ficrons. Ovates tend to be narrow. Square-ended handaxes and cleavers are relatively abundant, unlike other groups. Twisting of the tip or profile is almost absent.
	II (with ovates)	A B Attributed to Group II	MIS 11	Pointed types are dominant, but ovate types often occur. Cleavers are generally absent. Handaxes tend to be broader than Group I. Sub-group B has a greater proportion of broad ovates than sub-group A. Twisting of the tip and profile occur in low – moderate proportions (not more than 15% of the sample).
	III (plano-convex)	-	MIS 9	Narrow pointed types are common. Plano-convex handaxes occur in significant numbers. Twisting of the tip or profile is absent.
Intermediate	(IV) (generalized)	-	-	A wide range of types and forms represented. Roe (1981) stated that this group could ‘legitimately be ignored’, as the samples of the four sites in question lacked unity and integrity. Twisting of the tip and profile occurs in low – moderate proportions.
Ovate	V (archaic)	-	MIS 15 – 13	‘Coarseness’ or crudity are the defining characteristic of this group, with narrow, large and massive types prevalent. Twisting of tips is both rare and crude; twisting of profiles and the occurrence of *tranchet* removals are almost unknown
	VI (more pointed ovate shapes)	A B C D Attributed to Group VI	Sub-groups A, B and C: MIS 11 Sub-group D: Middle Palaeolithic Attributed to Group VI: possibly mixed, MIS 11 and MIS 13 – 12	More pointed ovate shapes dominate, but pointed planforms are rare. Cleavers are absent. Sub-groups were determined based on planform preferences and technological features; for example, sub-group B are narrower than sub-groups C and D, and twisted profiles are more common.
	VII (less pointed ovate shapes)	-	MIS 13	Ovate forms are common, but pointed planforms are extremely rare.

		Blunt and square-ended ovates are common. Twisting of the tip or profile is very unusual.

In addition to broad morphometric preferences, it had become clear that certain typologies could be associated with certain MI stages (Westaway et al. 2006; White et al. 2018, 2019). Twisted ovates and cordates in large proportions were found to be a feature of MIS 11 (White 1998b; White et al., 2019); the co-occurrence of ficrons and cleavers was suggested to be characteristic of MIS 9 (Roe 2001; Wenban-Smith 2004; Pettitt & White 2012; Bridgland & White 2014, 2015, 2018; Davis et al. 2016; Taylor 2019). A relatively high typological diversity was also suggested as a characteristic of later Lower Palaeolithic handaxe assemblages (Wenban-Smith 2004), as was an increasing preponderance of formal flake-tools in a foreshadowing of Middle Palaeolithic technologies (Scott 2010; White & Bridgland 2018), although the latter point has recently been challenged (Rawlinson 2021; Rawlinson et al., 2021).

The chronological patterning of non-Acheulean techno-complexes is well documented and is evident throughout the British Lower Palaeolithic, although the ages at which each new technology appears or reappears are often still subject to debate. The Clactonian is particularly hotly debated, especially in its incarnation in early MIS 9 (for a full discussion of the Clactonian, see McNabb 1992, 2007; McNabb & Ashton 1995; White 2000; Rawlinson 2021). The emphasis of the present study is firmly focussed on MIS 9 handaxes, the other tool types of MIS 9 being the subject of a parallel research project (Rawlinson, 2021). However, an overview of the chronologically significant occurrences of different tool-types in the British Lower Palaeolithic is summarised below in table 2.4.

Table 2.4. A summary of the succession of technocomplexes evident in Britain in the Lower Palaeolithic. Note the particular diversity of technological modes in MIS 9 (with 1, 2 and 3 all represented).

Techno-complex	**Mode (Clarke 1969)**	**Suggested chronological significance**	**Key references.**
Core-and-flake (first appearance of archaeology in Britain)	1	MIS 21 – 25 (Happisburgh)	Parfitt et al. (2010); Preece & Parfitt (2012)
		MIS 15c (Happisburgh)	Westaway (2011)
		MIS 19 or MIS 17 (Pakefield)	Parfitt et al. (2005); Preece & Parfitt (2012)
		MIS 15e (Pakefield)	Westaway (2009)
Acheulean (first appearance of handaxes in Britain)	2	MIS 15	White et al., (2018); Davis et al., (2021)

Clactonian (basal occurrence preceding Acheulean, Middle Pleistocene)	1	Early MIS 11 (e.g., at Swanscombe) and early MIS 9 (e.g., at Purfleet	Wymer (1968, 1999); Bridgland et al., (2013); Rawlinson (2021).
Proto-Levallois	3	MIS 9b (MIS 9/8)	Westaway et al. (2006); Bridgland et al. (2013); Rawlinson (2021).
Developed Levallois (first appearance in Britain)	3	MIS 8/7	Bridgland (1994, 2006); Wymer (1999); Schreve et al., (2002); Scott (2010).
Absence of fresh archaeology in Britain (no hominin presence)	-	MIS 6 - 4	White & Schreve (2000); Bridgland (2006).
***MTA* (particularly *bout-coupé* handaxes)**	*2 (MTA)*	MIS 3	White & Jacobi (2002); White (2012).

2.12. Scales of patterning in handaxe morphology.

The evidence for regional-scale spatial patterning, and sub-millennial scale temporal patterning in handaxe morphology has only recently become possible through improvements in the dating of sites, the discovery of new well contextualised sites, and the reanalysis of large historical artefact collections. The identification of geographically and chronologically delineated handaxe morphologies at these scales has only been identified in Europe and Britain in the last few years. Whilst no spatial or temporal patterning has so far been suggested for MIS 9, the presence of such patterning in other periods sets a precedent which deserves further investigation.

Handaxe cultures are restricted in space and time at a variety of scales. At the largest scale the Acheulean itself has been described as a socially transmitted cultural entity, although the vast temporal and geographical range of the techno-complex makes this seem improbable (Shipton 2020). Suggested alternatives include the repeated reinvention of handaxes independently at different times and in different places (Tennie et al., 2016, 2017) or entirely independent handaxe traditions having formed in Asia, Europe and Africa (Barsky et al., 2018). Shipton (2020) suggested that the western Acheulean (i.e., the Acheulean in regions to the west of the Movius Line) was a 'coherent cultural entity' originating from a single source area. Regardless of which, if any, of these suggestions is accepted, there is an argument to be made for an Acheulean culture operating over millions-of-years at an inter-continental scale (albeit a culture with concomitantly enormous internal variability).

A step down in scale might seek to identify continental and hundreds-of-thousand-year scale patterning. Wynn & Tierson (1990) compared handaxe shapes from Africa, Israel, India and Europe across multiple periods, and were able to statistically show a difference between the Israeli handaxes and the other groups, although again they identified a large degree of variability across all regions (particularly in British handaxes). A further step down would be more regionally restricted (intra-continental) cultures which endured on the scale of hundreds of thousands of years. The climatically driven cycle of colonisation, extirpation and recolonisation means that such long-lived occurrences are not seen in Britain (although the similarity between certain MIS 11 and MIS 9 handaxes noted by McNabb (2007) may qualify and will be discussed below) but may have been a feature in more climatically stable regions in the south. Bordes (1966) identified an *Acheuléen Meridional* tradition confined to southern France and Spain, and an *Acheuléen Septrional* tradition considered to represent the 'classic' handaxes of northern France (Mourre & Colonge 2007; Ashton et al., 2016). Acheulean sites in the western Iberian Peninsula appear to show a distinct cultural signature, possibly descended from the African Large Flake Acheulean (LFA) and consisting of handaxes and flake-cleavers, along with rarer types such as trihedral picks (Rubio-Jara et al., 2016; Méndez-Quintas et al., 2020). Although the geographical occurrence of the LFA in Europe is limited to Iberia, it appears to have been a long-lived phenomenon, with LFA sites spanning MIS 9 – 6 and occurring contemporaneously with Early Middle Palaeolithic sites elsewhere in the region (Méndez-Quintas et al., 2020).

Reducing the scale further might identify cultural signatures which are both chronologically and geographically restricted at a regional, decamillennial scale. These have proved more elusive until relatively recently but are evident in the shifting morphological preferences identified in successive interglacial periods in Britain which form a large part of the basis for the present study (e.g., Roe 1968a; Bridgland & White 2014, 2015, 2018; White et al., 2018).

Finally, sub-regional, sub-millennial patterning in handaxe morphology and typology has recently been identified in both the British and European record. In Europe, Moncel et al., (2020a) recently identified technological and morphological patterning in MIS 11 – 10 sites in the Frosinone-Ceprano basin, Italy. In Britain, at least two successive Acheulean cultural groups in MIS 13 and a further two in MIS 11 have been identified (White et al., 2019; Ashton & Davis 2021). The latter are of particular interest, as the occurrence of twisted ovate handaxes before and after the cool MIS 11b interstadial appears to show sub-regional geographical patterning, perhaps to the point that the home-range of a single cultural group can be identified (White et al., 2019; Ashton & Davis 2021).

The tripartite archaeological succession recorded in MIS 9 in Britain provides a limited sub-MIS scale chronological framework, but no sub-MIS scale patterning in handaxe morphology has been identified yet within the interglacial. Likewise, regional patterning has not been firmly identified in British MIS 9 Acheulean sites, although it has been tentatively suggested for the Solent (Wenban-Smith 2001). At the smallest scale – representing the actions of individuals and small groups over a period of days to years – unique or highly temporally and spatially restricted occurrences may be identified. Several have been posited for MIS 9; possible examples include the occurrence of large numbers of plano-convex handaxes at Wolvercote (Tyldesley 1986), also identified in smaller numbers in assemblages from the Solent region (Roe 1981; Wenban-Smith et al., 2000; Ashton 2008; Davis et al. 2016), and the 'lopsided' handaxes found in significant numbers at Broom (Hosfield et al, 2013b, 2013c). At the smallest scale, singular examples of 'idiosyncratic' handaxes may be identified. Published examples of this may include extreme pointed forms making use of the burrow flint raw material at Cuxton (Shaw & White 2003), and distinctive 'notching' near the tip of pointed handaxes from Leytonstone (Taylor 2019).

2.13. Handaxe 'meaning' in Lower Palaeolithic society.

The wider 'meaning' of the handaxe in Lower Palaeolithic society has increasingly become the subject of interest. This is because the high degree of workmanship and symmetry, and occasionally great size seen in some handaxes has been suggested to exceed the demands of pure functionality. This is based on relatively scant evidence, generally gathered from experimental studies; however, the fact that symmetry was found to have little impact on the efficacy of the handaxe as a butchery tool does offer some support to the idea that handaxes were 'over-engineered' (Machin et al. 2005, 2007).

Gamble (1999) envisaged handaxe manufacture as a social performance and a way of expressing identity and mediating a place within a social group in a pre-linguistic world. Kohn & Mithen (1999) suggested that the handaxe acted as a mechanism of expressing 'fitness' in the Darwinian sense, in order to facilitate sexual selection. They postulated that a male hominin might demonstrate its fitness through producing a symmetrical, aesthetically pleasing handaxe – essentially, an inanimate analogue for health and intelligence. The handaxe maker would have to be observed by potential mates in order to avoid 'cheating', which Kohn & Mithen suggested explained the great abundance of handaxes in the archaeological record (suggesting that sexual selection pressure was a near-constant throughout the Lower Palaeolithic). Likewise, the overly elaborate, large handaxes occasionally found were suggested to represent particularly flamboyant attempts to attract mates. Kohn & Mithen's theory proved to be controversial and was widely challenged (e.g., by Machin

2008; Nowell & Chang 2009; Hodgson 2009; although it has also received some support, e.g., Burriss 2009) not least because it is untestable – an issue equally applicable to subsequent attempts to explain handaxe form and symmetry through a social or cognitive lens (McNabb 2007). Nevertheless, the work of Kohn & Mithen and Gamble prompted other attempts to explain the 'meaning' of the handaxe in Lower Palaeolithic societies. Spikins (2012) agreed with the idea of the handaxe acting as a means of signalling, however she proposed that high degrees of symmetry in handaxes signalled trustworthiness to other individuals rather than competitive sexual fitness to potential mates. In essence, she argued that the attention to detail or care taken in imposing visually pleasing dimensions on a handaxe signalled a sort of generalised altruism to others, which would strengthen inter-personal and inter-group bonds and so mitigate risk (in hunting, for example). McNabb (2007) suggested a 'Visual Display Hypothesis', where the display of handaxes and handaxe manufacturing was 'intended as platforms for individual preferment', or more succinctly, it allowed the knapper to 'show off' to their own social advantage.

The overarching theme of these ideas is that the handaxe was a means of communication or signalling as well as a physical tool. Whereas Kohn & Mithen's (1999) 'Sexy Handaxe Theory' viewed the handaxe as an analogue for genetic fitness, Spikins (2012) and McNabb (2007) both viewed the handaxe as a semiotic object. This idea is elaborated on by Pope et al. (2015), who suggest that artefact form and the structured discard of artefacts were a means of indirectly communicating with other groups and individuals. This 'release from proximity' is seen as an important step in the development of language and a distinguishing feature of humans from other primates (Rodseth et al. 1991).

White & Foulds (2018) departed from the idea of the handaxe as primarily being a means of external signalling, instead suggesting that handaxe production elicited dopamine release associated with the 'rewards' of handaxe manufacturing, and the intrinsic pleasure of producing a symmetrical or personally distinctive object: as they summarised, 'making handaxes made Acheulean hominins happy'. These theories are not mutually exclusive; Spikins (2012) remarked that a well-made handaxe would be as useful for signalling trustworthiness to a potential mate as to a hunting partner, and Kohn & Mithen (1999) suggested that handaxes were made symmetrical to exploit 'the perceptual biases of an evolved psychology', to some extent presaging White & Foulds' (2018) hypothesis. White & Foulds (2018) explanation of handaxe symmetry could be applied in tandem with other theories also: the dopamine reward could just as easily be prompted by association with sexual or social advantage as butchery or personal satisfaction, a fact which they highlighted. Likewise, none of the social explanations for handaxe symmetry and form necessarily conflict with either cultural, cognitive (mental template) or technological (raw material control, re-sharpening) models: in each case, handaxe form is taken to be a complex interaction between raw materials, the landscape, the individual, society and culture.

2.14. Handaxe symmetry.

Handaxe symmetry has often been assumed to have increased throughout the Middle Pleistocene, to some extent mirroring the now rejected early thinking on handaxe morphology which assumed progression from relative crudity to refinement (e.g., de Mortillet 1883; Commont 1908; Breuil 1932; Bordes 1953; see discussion above). The appeal of progressive or evolutionary change to handaxe symmetry is predicated on the possible link between symmetry and cognition, a concept well summarised by Hodgson (2015) and seemingly supported by several international studies which appeared to show increasing levels of symmetry and refinement over time (e.g., Saragusti et al. 1998; Beyene et al. 2013; Shipton 2013). However, McNabb & Cole (2015) argued that no evolutionary trend in handaxe symmetry has ever been robustly identified, and that previous studies of symmetry have typically suffered from small numbers of sites or from small sample sizes. Two recent British studies may now be weighed into the discussion.

White & Foulds (2018) compared handaxe symmetry from 22 British Acheulean sites ranging in age from MIS 15 - MIS 8 using Hardaker & Dunn's (2005) FlipTest programme. Sites were selected on their stratigraphic coherence and the reliability of the original collectors. Whilst the overall levels of symmetry in British handaxes were higher than White & Foulds' had anticipated, there was no trend in their data from less to more symmetrical over time. Their findings are shown in figure 2.7.

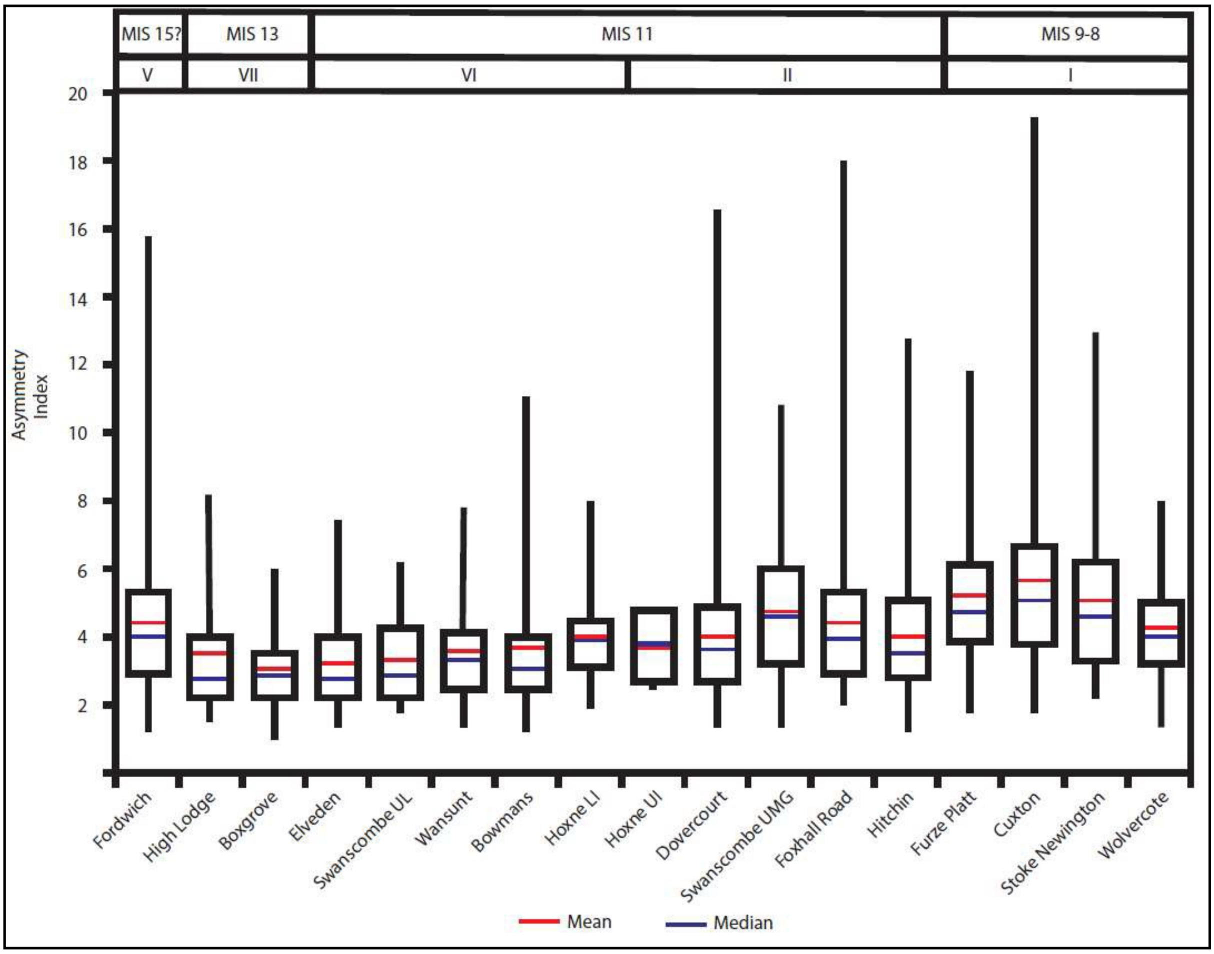


Figure 2.7. Box and Whisker chart from White & Foulds (2018) showing symmetry measures for handaxe assemblages (sorted according to Roe's groups).

In fact, the levels of symmetry in the most recent assemblages in their study (thought to be of MIS 10 – 8 age) were distinctly varied, showing a wide spread of results. Group II sites (MIS 11) showed a very slightly stronger tendency towards higher symmetry, whilst Groups VI and VII sites (MIS 11 and MIS 13 respectively) showed the highest levels of symmetry. The results presented in White and Foulds (2018) suggested that British handaxes became marginally *less* symmetrical over time, from peak symmetry in Group VII (MIS 13) and Group VI (representing part of MIS 11). It is perhaps also notable that the more pointed Groups (I, II and V) were less symmetrical on average than the more ovate Groups (VI and VII). White suggested that the apparent trend in White & Foulds (2018) were at least partially the result of collection bias, pointing to the 'warts and all' collecting strategies of Worthington Smith and Lacaille (at Stoke Newington and Furze Platt respectively) versus collections from chronologically earlier sites which represent the work of multiple collectors who may have been more selective in retaining better (and more symmetrical) pieces (M. White *pers. comm*. 13.10.2020).

Hoggard et al. (2019) also charted symmetry in British handaxes, using a Geometric Morphometric (GMM) methodology to map changes in handaxe shape and symmetry over the Lower Palaeolithic. They assessed nine British Acheulean sites spanning MIS 13 - 7, along with the Middle Palaeolithic site of Lynford. Their conclusions were less equivocal, stating that diversity in both shape and symmetry increased from MIS 13 to MIS 7. Hoggard et al. (2019) found that the most symmetrical handaxe sites represented single episode *in situ* accumulations and speculated that the palimpsestic nature of many Lower Palaeolithic sites might partially explain the apparent increase in shape and symmetry diversity from MIS 13 to MIS 7. This suggestion may be robustly countered, however, on the grounds that there is no reason to assume that assemblages formed from "contemporaneous events, representing a few generations at maximum" (Hoggard et al., 2019) would result in more symmetrical handaxes; equally, it can be argued that secondary context assemblages are simply the result of multiple "contemporaneous events" aggregated together – symmetrical secondary assemblages would result from accumulations of symmetrical *in situ* assemblages, with the same true of more asymmetrical examples. It may also be argued that an assemblage representing (at least) several generations such as Boxgrove (Roberts & Parfitt 1999), does not represent a strictly contemporaneous event at all and is itself a palimpsest.

2.15. The Clactonian, Acheulean and (proto-) Levallois.

Much of the following summary necessarily re-treads arguments which are fully discussed by Rawlinson (2021), who examined the Clactonian, Levallois and non-handaxe components of the Acheulean of MIS 9: however, a brief consideration of the key debates surrounding each techno-complex, and a short summary of their defining attributes, is necessary.

The Clactonian.

The Clactonian, named for the type-site at Clacton, Essex, is a core-and-flake techno-complex found in southern Britain at the beginning of both MIS 11 and MIS 9. Its defining attribute is a lack of handaxes or evidence of handaxe manufacture (White 2000; Pettit and White 2012), a definition which has caused some controversy in the past and which lies at the root of the so-called 'Clactonian debate'. This argument initially involved contesting the existence of a discrete Clactonian 'culture', with the credentials of many sites contested on the ground of their being mixed with Acheulean assemblages (where the two components would be indistinguishable), and on the grounds of inadequate assemblage size (McNabb and Ashton, 1992; Ashton and McNabb, 1992; Ashton et al., 1994a). The latter point is particularly important, as the identification of a Clactonian site relies on negative or absent evidence (i.e., no handaxes), and so a large sample size is needed to be confident that handaxes really were not part of the lithic repertoire. The presence of crude 'non-classic' bifaces confused the issue further, although the importance of these tools may have been overstated in the past (McNabb & Ashton 1992, although this point is returned to below). A wide range of possibilities have been discussed regarding the 'significance' of the Clactonian, including it representing a preparatory stage for handaxe manufacture (Ohel 1979), a response to specific functional requirements (Rolland 1992; McNabb 1992), raw material constraints (Ohel 1979), and reduced social complexity relating to smaller group sizes during colonisation events (Narr 1979; Mithen 1994). White & Schreve (2000) approached the problem from a different angle, suggesting instead that the Clactonian and Acheulean populations in MIS 11 and MIS 9 originated as distinct populations on continental Europe, the former from non-handaxe producing populations in central and northern Europe and the latter from handaxe-producing populations in western and southern Europe. Rawlinson (2021) examined historical artefact collections from the MIS 9 Clactonian, confirming its validity as a genuine cultural phenomenon; improved dating at key sites has lent some weight to the 'ebb and flow' colonisation model of White & Schreve (2000) as being a likely explanation for the recurring presence of a discrete Clactonian technocomplex in MIS 11 and MIS 9.

The Acheulean.

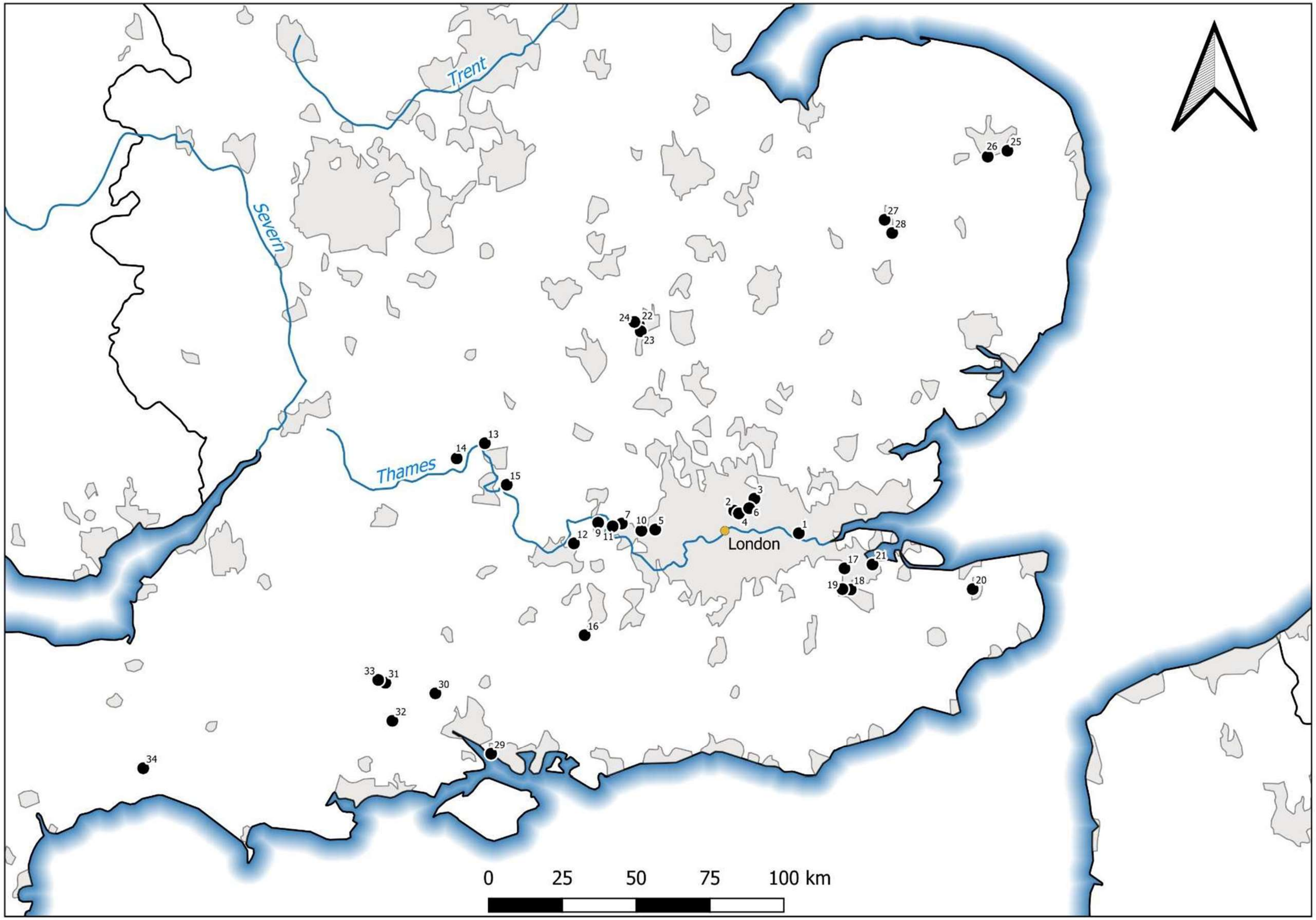
The handaxe is the defining component of the Acheulean techno-complex, but the terms are not strictly interchangeable: the Acheulean may be defined by the presence of handaxes (or evidence of handaxe manufacture, such as thinning flakes), but an Acheulean assemblage may also include simple core-and-flake working and both basic and formal flake tools (notches, flaked-flakes, denticulates, side-scrapers, end-scrapers, convergent scrapers etc). These 'accessory' tools are understudied compared to handaxes, at least partly due to their poorer representation in historical museum collections (a result of biases in both collection and curation). The simple core-and-flake technologies present in Acheulean assemblages are generally indistinguishable from the same types of tool found in Clactonian (non-handaxe) assemblages (White 2000; Rawlinson 2021). Flake tools are widely known in Acheulean assemblages, but invariably in smaller numbers than handaxes and almost never reaching the threshold of 100 objects set by Bordes (1961) for meaningful analysis (McNabb 2007; Rawlinson 2021). Although Lower Palaeolithic flake tools have been described as simple and lacking in planned form (McNabb 2007; Ashton et al., 2016), flake tools had previously been suggested to have increased in both complexity and numerical importance during MIS 9 (Roe 1968b; White & Bridgland 2018). There are hints that this may be the case at certain sites (e.g., Stoke Newington), but a comprehensive reanalysis by Rawlinson (2021; Rawlinson et al., 2022) identified no significant changes in either numerical abundance or technology in MIS 9 flake tools relative to earlier interglacial periods, although it was suggested that higher proportions of flake tools were linked to handaxe rich sites (e.g., Biddenham, Kempston, Grovelands Pit c.f., Botany Pit).

Levallois technologies.

The replacement of the Acheulean techno-complex with tools produced using the Levallois prepared-core technique (shortened hereafter to Levallois, or Levallois technology) is typically used to delineate the transition from the Lower to Middle Palaeolithic, although recent work has shown the transitional process to be more drawn out, irregular in tempo, and inclusive of a wider range of behavioural and societal changes than had previously been acknowledged (e.g., Kuhn 2013; Moncel et al., 2020b and others, discussed fully below). The Levallois technique is predicated on producing predetermined flake products from a prepared core (Gamble and Roebroeks 1999; White and Jacobi 2002). Boëda (1995) outlined six criteria which define (and allow the identification of) Levallois products:

1. The creation of a core whose volume is divided into two surfaces by an intersecting plane.
2. The two surfaces created are hierarchical and non-interchangeable (a striking platform surface, and a flaking surface).
3. The flaking surface is prepared in a way in which the shape of the final knapping products are predetermined through the management of distal and lateral convexities.
4. The fracture plane for the removal of final products (Levallois flakes) is parallel to the plane of intersection between the striking-platform surface and flaking surface.
5. The intersecting plane between the two surfaces is perpendicular to the flaking axis of the predetermined blanks.
6. Hard hammer percussion is used throughout the process.

In practise, these features can be very difficult to identify on artefacts, particularly the final (Levallois flake) product. The appearance of Levallois technology in late MIS 9 is a complex and contentious issue, which is fully examined by Rawlinson (2021). He followed Bridgland et al., (2013) and White and Bridgland (2018) in suggesting that the Levallois products from late MIS 9 contexts were a form of 'simple prepared-core' technology, or 'proto-Levallois'. These tools fulfilled some, but seldom all, of Boëda's six criteria as outlined above, and were particularly common at Botany Pit, Purfleet, Essex and a handful of other sites in south-eastern Britain. Rawlinson followed others (e.g., White and Pettit 1995; Gamble 1999) in suggesting that early, 'proto-Levallois' technologies were immanent within the Acheulean. The relationship between these early expressions of prepare core technology and later, Early Middle Palaeolithic 'fully-developed' Levallois technology is not entirely clear.



Map 1.

1. Purfleet
2. Stoke Newington
3. South Woodford
4. Lower Clapton
5. Hillingdon (Yiewsley)
6. Leyton
7. Baker's Farm
8. Cookham
9. Furze Platt
10. Iver
11. Lent Rise
12. Ruscombe
13. Wolvercote
14.Gravelly Guy (Stanton Harcourt)
15. Berinsfield
16. Farnham
17. Cuxton
18. Aylesford
19. Ham Hill
20. Canterbury
21. Twydall
22. Biddenham
23. Kempston
24. Bromham
25. Whitlingham
26. Keswick
27. Thetford
28. Barnham Heath
29. Warsash
30. Dunbridge
31. Milford Hill
32. Woodgreen
33. Bemerton
34. Broom

Chapter Three: Site Backgrounds.

3.1. Introduction.

Roe (1968a) selected sites for his morphometric study based on the 'unity' of the handaxe assemblage, meaning assemblages he considered to have formed at approximately the same time and in the same place rather than palimpsests or assemblages containing material derived from multiple periods. An example of this strategy may be seen in the selection of Roe's Stoke Newington sample, which included only less abraded objects in an attempt to capture the supposedly *in-situ* 'Palaeolithic Floor' material (**see below**) whilst excluding objects from the underlying gravels.

The approach to site selection used in this study was far less stringent in terms of the 'unity' of the assemblages, focussing instead on the age of the site (i.e., their situation on or within deposits dated to MIS 9). Factors such as collector's bias, derivation from older deposits, and selective acquisition by museums, will be outlined (and where possible, mitigated) in the interpretation of results but were not a decisive factor in the initial selection of sites. Two sites thought to date to MIS 7 (Stanton Harcourt and Berinsfield) were also included; this was due to the rarity of large Acheulean assemblages in the MIS 7 interglacial, the fact that the handaxe assemblages may well be derived from MIS 9 anyway, and the uncertainty of the dating of the Upper Thames terraces.

In practise, the implementiferous deposits in question were almost always river terrace gravels, and age attributions were almost always based on the correlation of those deposits with the Thames terrace staircase (the Lynch Hill terrace and its correlatives). Sites were identified through the creation of a database derived from data available through the Archaeological Data Service (ADS) 'The English Rivers Project' (TERPS) online database, which provided artefact counts and a brief geological context; artefact numbers and locations were also culled from Roe's gazetteer of Lower and Middle prehistoric archaeology in UK museums (Roe 1968b). The age of sites was verified wherever possible through consultation of previously published literature. Geochronological dating was considered in site selection, but generally as corroborating evidence where stratigraphic dating evidence was lacking. Likewise, the occurrence of proto- Levallois technology was considered as relevant dating evidence, as this has been used (albeit controversially) to 'anchor' Lynch Hill correlative terraces (especially in the Solent, e.g., Westaway et al. 2006), although this evidence was only used as a last resort and in the absence of other evidence. Crucially, sites were *not* selected based on the morphometric or typological characteristics of their handaxe assemblages, as this would have constituted circular reasoning – but it should be stressed that the dating of many of the following sites is not robust and should be treated with due caution.

Assemblages were generally sought out where significant numbers of handaxes were available for measurement, as larger sample sizes are more useful for morphometric analysis given that much of the interpretation of results is based on the comparison of metrical averages and ranges. An effort was made to identify and sample sites from the widest possible geographical area across southern England, however as sites on the Lynch Hill terrace of the Thames are both the most numerous and prolific there is an inevitable numerical bias towards that river system.

3.2. The Lower Thames and London.

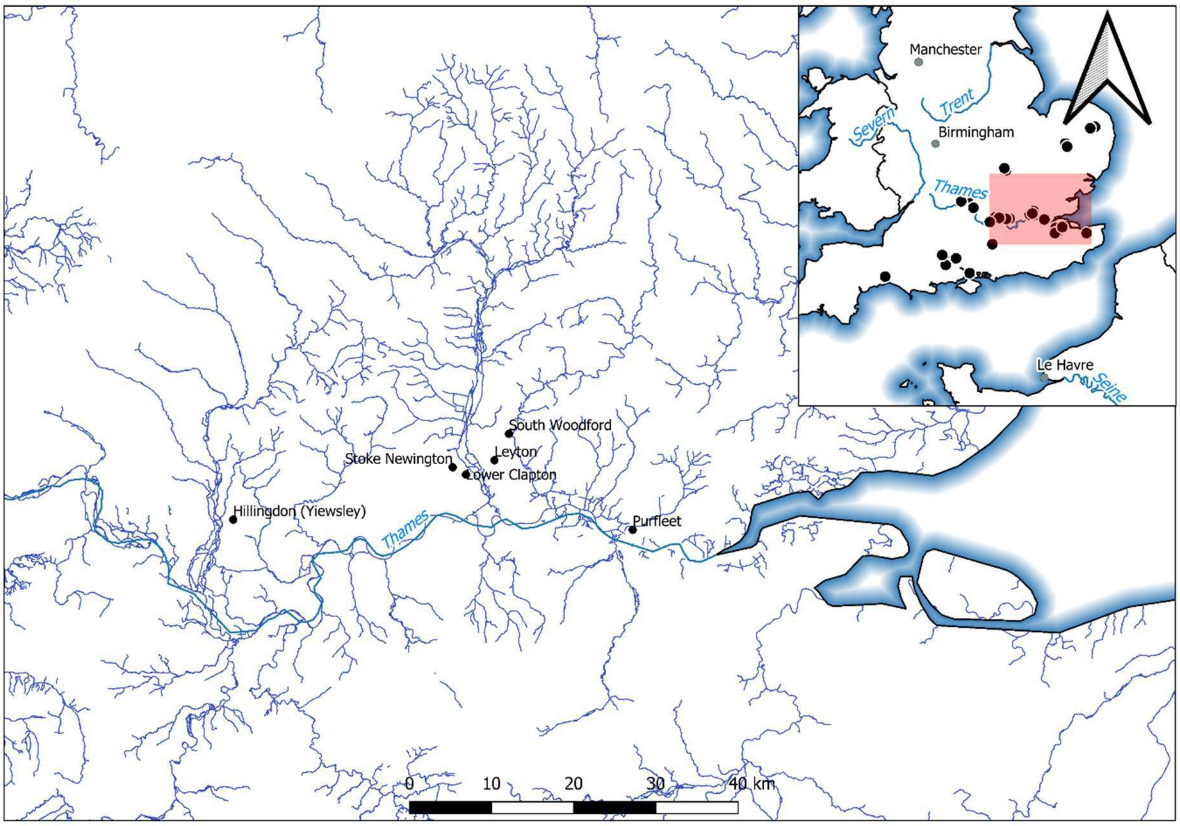


Figure 3.2. The Lower Thames.

3.2.1. PURFLEET, Essex. (Botany Pit, TQ 557 786)

Site history.

The site at Purfleet consists of the localities of Bluelands Pit, Greenlands Pit, Esso Pit and Botany Pit as well as several peripheral localities. Pleistocene deposits at Purfleet were revealed by gravel and chalk extraction in the 1960s and 1970s. A. Snelling conducted the first archaeological work at Purfleet in 1965 (in Wymer 1965, 1985), followed by work by S. Palmer (1975). The development of the High Speed 1 (HS1) rail link prompted a thorough geoarchaeological reinvestigation of the Purfleet complex (Bridgland et al. 2013), which confirmed the important tripartite archaeological succession at the site previously suggested by Wymer (1985). Sections at the site have been revitalised by the Quaternary Research Association (QRA) at various points, most recently in 2019 (Schreve et al., 2019).

Geology and stratigraphy.

The Quaternary deposits at Purfleet were probably deposited by the Thames (Schreve et al., 2002; Bridgland et al., 2013), although Gibbard (1995) had previously suggested that the deposits were formed by the Mar Dyke, a north-bank Thames tributary. The deposits banked up against a chalk cliff. A simplified version of the full stratigraphic sequence at Purfleet, using the accepted formal lithostratigraphic nomenclature (in bold) alongside the bed number and a short geological description, is shown below in table 3.1 (after Bridgland et al., 2013).

Table 3.1. A summary of the stratigraphy at Purfleet, after Bridgland et al., (2013).

Bed number.	**Unit name.**	**Description.**
8	**Botany Gravel**	Gravels, sands and silts deposited in a braided stream, forming part of the Corbets Tey Upper Gravel. This bed has been equated with MIS 8, although the occurrence of Levallois technology may suggest a slightly earlier (MIS 9/8 transition) age.
7	-	Decalcified clay/ silt, probably with a warm-climate water-lain origin. This bed occurs in the north side of Greenlands Pit but is otherwise absent.
6	**Bluelands Gravel**	An interglacial or post-interglacial gravel associated with Acheulean technology.
5	**Greenlands Shell Bed**	A shell rich bed deposited under fully interglacial freshwater conditions, identified in Bluelands and Greenlands Pits.
4		Laminated sand, silt and clay (interglacial estuarine deposit). These sediments represent an incursion of marine waters far inland of the current Thames estuary, and as such represent high relative sea-levels. This has been equated with MIS 9e, the fully interglacial sub-stage

		of MIS 9 when temperatures (and consequently sea-level) peaked.
3		Shelly Gravel. An interglacial sandy gravel with abundant mollusc shells. Some Clactonian artefacts occur at the interface with the basal gravel.
2	**Little Thurrock Gravel**	A cold-climate gravel containing Clactonian artefacts. Deposited in the later part of MIS 10.
1		Coombe Rock (soliflucted chalk breccia)
(0)		Chalk bedrock.

Biostratigraphy.

An extensive mammalian and molluscan faunal assemblage was preserved at Purfleet, which has provided evidence for the age of the deposits in addition to key environmental and climatic information. Key differences between the composition of the mammalian assemblage at Purfleet and sites attributed to the MIS 11 interglacial were particularly useful in establishing Purfleet as a site of MIS 9 age (Schreve et al. 2002; Roe et al. 2011). The diversity of taxa represented in the fine-grained deposits (Beds 3 – 5) was interpreted as evidence for fully interglacial climatic conditions (Preece 1995; Schreve et al. 2002).

Terrace stratigraphy.

The deposits at Purfleet may represent the full 'sandwich' of glacial – interglacial – glacial deposits forming the Corbets Tey Formation, the Lower Thames correlative of the Lynch Hill terrace (Bridgland 1994, 2006; Bridgland et al., 2013). The Little Thurrock Gravel represents Phase 2 of Bridgland's (1994) terrace model, which formed at the ameliorating climatic transition from MIS 10 to MIS 9. The Botany Gravel may represent Phase 5 of Bridgland's terrace model, which formed at the deteriorating climatic transition from MIS 9 to MIS 8 (Schreve et al., 2002; Bridgland 2006), although Bridgland et al., (2013) and White & Bridgland (2017) considered the possibility that the Purfleet sequence may only record the first, warmest substage (MIS 9e). In this case, the Botany Gravel would represent the cooling MIS 9e – 9d transition, or no cooling transition at all may be represented if the uppermost beds are decalcified (as has been suggested in Bridgland et al., 2013). The MIS 9 age attribution is broadly supported by OSL and AAR dating (Bridgland et al., 2013).

Archaeology review.

Roe (1968b) provided an inventory of artefacts from Botany Pit held in UK institutions. The figures presented below in table 3.2 do not include artefacts found after 1968, although only a handful of handaxes appear to have been found since then (Schreve et al., 2002; Bridgland et al., 2013).

Table 3.2. Purfleet Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Purfleet (Botany Pit)	14	3599	129
TOTAL	14	3599	129

Purfleet is regarded as the archaeological type-site of the MIS 9 interglacial, in part due to the tripartite archaeological succession at the site. The oldest industry is Clactonian, dated to the MIS 10/9 transition; the youngest industry is proto-Levallois, dated to the MIS 9/8 transition. These archaeological occurrences are chronologically significant within the MIS 9 interglacial, providing anchoring points which may be used to date deposits (e.g., Westaway et al. 2006), although this application is not universally accepted (Ashton & Hosfield 2010; Davis et al., 2016; Hatch et al., 2017). Beds 3 – 5 were tentatively dated to MIS 9e based on malacological and sedimentological indications of particularly high sea-levels, which occurred early in the MIS 9 interglacial (Roe et al., 2009, 2011; Bridgland et al., 2013). The dating of the handaxe-bearing Bluelands Gravel can only be given the age range of post-MIS 9e to pre-MIS 9/8 transition, although it was perhaps earlier rather than later given that the Bluelands Gravel is itself overlaid by a temperate-climate deposit (Bridgland et al. 2013).

Given the importance of the site to understanding the MIS 9 interglacial, it is regrettable that the Acheulean assemblage is small and has received only cursory analysis in the past. The author of the present study was sadly unable to locate and access the bulk of this material save for a small unifacial flake-handaxe (type E) from Botany Pit, which could equally be described as a flake tool. Wymer (1968) provided an analysis of Snelling's collection from Botany Pit. This included just nine handaxes in addition to one butt fragment. These handaxes were generally crude and mostly in 'slightly rolled' condition. Wymer's analysis is shown below in figure 3.3.

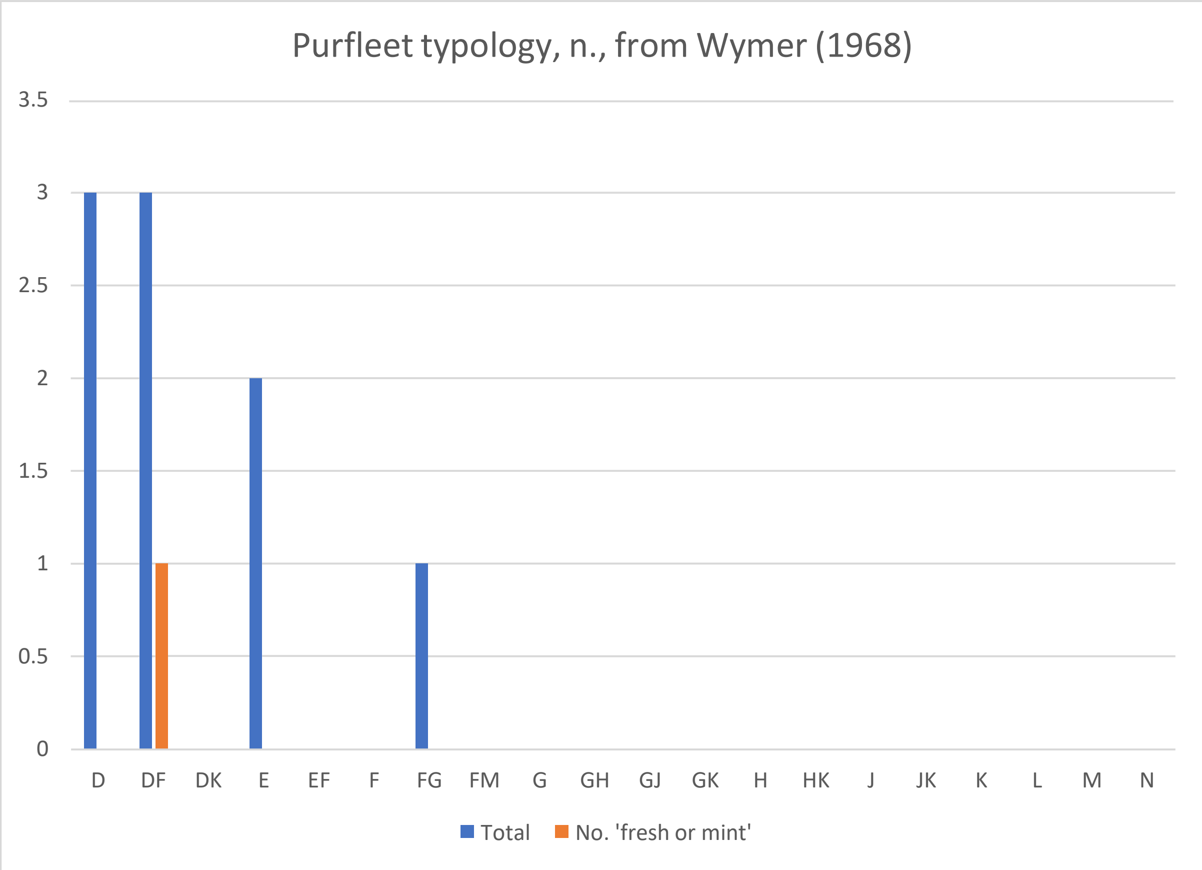


Figure 1 Purfleet handaxe typology from Wymer (1968).

Palmer (1975) identified a single handaxe from her work at Bluelands Pit in the 1960s. This example is another very small, somewhat ambiguous flake-handaxe (type E) which may be better described as a handaxe-shaped-flake. Schreve et al. (2002) described a single handaxe from the Armor Road extension work, found in the Bluelands Gravel. This was a small (97mm) sub-cordate (type G) handaxe in slightly rolled condition. Interestingly, this handaxe was also made on a flake.

3.2.2. STOKE NEWINGTON, London Borough of Hackney. (Common, TQ 339 865; Geldeston Road, TQ 344 867).

Site history.

Worthington Smith made the first discoveries of artefacts in the area north of Stoke Newington Common in 1878 (Smith 1878, 1884). He continued to collect artefacts and record stratigraphy as the area was developed until 1909 (Juby 2011). Smith described a ‘Palaeolithic floor’ which he interpreted as a preserved occupation level (Smith 1882a, 1894). S. Hazzledine Warren relocated Smith’s ‘floor’ in the area of Geldeston Road (reported in Roe 1981) but numerous attempts to relocate it between 1971 and 2004 proved fruitless (Roe 1981; Green et al. 2004). Nevertheless, geological investigations at Stoke Newington and at the nearby Nightingale Estate have provided valuable environmental and stratigraphic information which has improved understanding of the 'floor' (Green et al., 2004, 2006).

Geology and stratigraphy.

Smith (1884) considered 'the best section of the Palaeolithic floor' to be to the north of Stoke Newington Common. The underlying London Clay was overlaid by a basal river gravel containing abraded Palaeolithic implements. This was in turn overlaid by fossiliferous sands containing key molluscan species (*Belgrandia marginata* and *Corbicula fluminalis*) (Smith 1892b). The fossiliferous sands were in turn associated with, and overlaid by, stratified sands which Smith (1884) interpreted as fluvial sands produced by the flooding of the Thames or Lea. The 'Palaeolithic floor' itself presented as a gravelly stratum between 5.08 and 15.24cm (2 – 6") thick within or at the surface of the stratified sand (Smith & Greenhill 1884), which was itself found between 1.22 and 6.10m (4 – 20') from the surface (Roe 1981). The height of the 'Palaeolithic floor' ranged from 26.4m – 20.7m (87 – 68') O.D. depending on where the stratigraphy was observed, suggesting either multiple occupation horizons or that the preserved terrain had markedly high topographic variation across a small area (Green et al., 2004; Pettit & White 2012). The former seems more likely; at least one instance of a stacked 'duplicate' floor was observed (Smith 1884). The sequence was capped by Langley Silt, a polygenetic brickearth of younger age (Gibbard 1994). Smith (1894) believed that the 'floor' once covered the whole of the historic county of East Middlesex and much of Hertfordshire, although he accepted that much of the surface had been denuded since its emplacement.

Biostratigraphy.

A large faunal and floral assemblage was described at both Stoke Newington and Nightingale Estate, Hackney, which pointed to interglacial climatic conditions marginally warmer than present (Green at al., 2004, 2006). The co-occurrence of the molluscs *C. fluminalis* and *B. marginata* at the Nightingale Estate and Stoke Newington matches the molluscan fauna at Barling (Bridgland et al., 2001) and Purfleet (Schreve et al., 2002; Bridgland et al., 2013) more closely than that of Swanscombe, suggesting an early MIS 9 age. The Stoke Newington mammalian fauna described by Smith (1884) included a diverse faunal assemblage which regrettably had an insecure provenance and so is of limited use.

Terrace stratigraphy.

The altitude of the exposed Stoke Newington Sands - the stratified sands described by Smith (1894) - is consistent with that of the Lynch Hill Terrace (Bridgland 1994). Investigations at the nearby

Nightingale Estate, Hackney, show a more complex series of erosional and depositional episodes. Green et al. (2004, 2006) proposed that the Highbury Silts and Sands at the Nightingale Estate and the Stoke Newington Sands represented two discrete depositional episodes, both within MIS 9 and perhaps occurring relatively close together within the early part of the interglacial (MIS 9e), or else a later warm sub-stage within MIS 9.

Archaeology review.

Roe (1968b) recorded artefact numbers from Stoke Newington held in UK museums, shown in table 3.3.

Table 3.3. Stoke Newington Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Stoke Newington (Common)	250	696	3
Stoke Newington (Geldeston Road)	68	293	0
Stoke Newington (Abney Park Cemetery)	29	374	1
Stoke Newington (other, including named roads near the Common)	50	21	1
TOTAL	96	37	1

Very few of the objects in the Smith and Warren collections are stratigraphically provenanced, although many in Warren's collection came from Geldeston Road (Wymer 1968; Roe 2009; personal observation). Smith acquired much of the Palaeolithic material from Stoke Newington personally, but he also collected material found by workmen and from freshly gravelled roads, and as such many of the handaxes may not have had a secure provenance to begin with (Juby 2011).

Smith (1882b) described the handaxes from the 'floor' as being sharp, generally 'small in size' with some exceptions, and 'well made'. The handaxes appear to have been unevenly distributed across the 'floor'; Roe's 1971 excavation unearthed a scatter of waste flakes, which he interpreted as representing the edge of Smith's 'floor' find area. Roe (1981) supposed that almost all the 'floor' material was 'perfectly fresh', but that not all the fresh material was derived from the 'floor' deposits. Separation of the sample along the lines of condition can therefore only provide the broadest estimation of stratigraphic provenance.

Roe (1968a) assigned Stoke Newington to his morphometric Group I, despite the relatively high proportion of metrical ovates recorded. He noted that the character of the Stoke Newington handaxes was subtly different to the other Group I sites, both in terms of the generally smaller size of the objects and in the prominence of what he described as the ‘tall and narrow scatter’ of shapes in the central (ovate) section of his Stoke Newington tripartite diagrams. Roe (1981) reiterated the key findings of his earlier study, emphasising the small size of the handaxes and suggesting that the object sizes were not the result of raw material availability. He also made note of a much larger than usual number of regular flake tools, which he described as being ‘proto-Mousterian’, which he considered to be ‘quite absent’ from his other Group I sites; Rawlinson’s reanalysis identified no distinction in condition and no reason to consider the flake tools separate from the handaxe industry, but he did note that the flake tools were relatively advanced compared to other non-handaxe sites (Rawlinson 2021). Wymer (1968) attempted to separate ‘floor’ objects from those derived from the gravels, however he was able to positively identify only 19 objects which could be confidently assigned to the ‘floor’ using Worthington Smith’s catalogue. These are summarised below in table 3.4.

Table 3.4. The nineteen implements identified as having originated from the 'floor' in Smith's unpublished catalogue (from Wymer 1968).

W.G.S Catalogue No.	Tool type	Wymer typology	Length (approx.), inches.	Provenance.	Condition
131	Handaxe	E	4	Floor	Sharp, sl. stained
545	Handaxe	E	3.25	Between Alkham and Kyverdale Road, south of Cazenove Road, 4ft. 6in.	Mint
546	Handaxe	F	4.25	Between Alkham and Kyverdale Road, south of Cazenove Road, 4ft. 6in.	Sl. Rolled, stained.
547	Handaxe	E	4	Between Alkham and Kyverdale Road, south of Cazenove Road, 4ft. 6in.	Rolled, sl. Stained.
548	Handaxe	E	3.25	Between Alkham and Kyverdale	Rolled, sl. stained

				Road, south of Cazenove Road, 4ft. 6in.	
557	Handaxe	F	4.25	Between Osbalderton and Kyverdale Roads.	Mint.
559	Handaxe	E	3.5	Between Osbalderton and Kyverdale Roads.	Sl. Rolled, stained.
560	Handaxe	E	3.25	Between Osbalderton and Kyverdale Roads.	Sl. Rolled, stained.
611	Handaxe	E	2.75	North end of Benthall Road.	Mint.
979	Handaxe	E	2.75	North end of Benthall Road.	Sharp, sl. Stained.
980	Handaxe	E	2.75	North end of Benthall Road, west of Tyssen St.	Rolled, stained.
986	Handaxe	E	3.75	Creighton Road.	Sl. Rolled, sl. Stained.
1135	Handaxe	E	2.5	Kyverdale Road.	Sharp, sl. Stained.
1205	Handaxe	E	3.5	North end of Benthall Road.	Mint, sl. Stained.
1257	Handaxe	E	3.5	Southwest of Kyverdale Road, south of Common.	Mint, sl. Stained.
1307	Handaxe	K	2.75	Southwest of Kyverdale Road, south of Common.	v. rolled.
1308	Side-scraper	-	3.5	Southwest of Kyverdale Road, south of Common.	Sharp, sl. Stained.
(BM Sturge coll.)	Handaxe	E	-	Floor	Sl. Rolled, stained on flake.
(Ashmolean Mus. 1928: 143)	Segmental Chopper	L	-	Floor	Sl. Rolled, stained.

The handaxes shown in table 3.4 are relatively small and crude, with 73.7% classified as E types. However, the condition of the handaxes is not consistent with Smith's original descriptions of the 'floor' material; only 47.4% are in 'mint' or 'sharp' condition, with 21.1% in 'rolled' or 'very rolled' condition. This would suggest that sorting the Stoke Newington handaxes by condition can only weakly separate 'floor' objects from gravel-derived objects. Nevertheless, Wymer (1968) attempted to capture the 'floor' material by measuring only those objects in 'sharp' or 'mint' condition (shown below in figure 3.4).

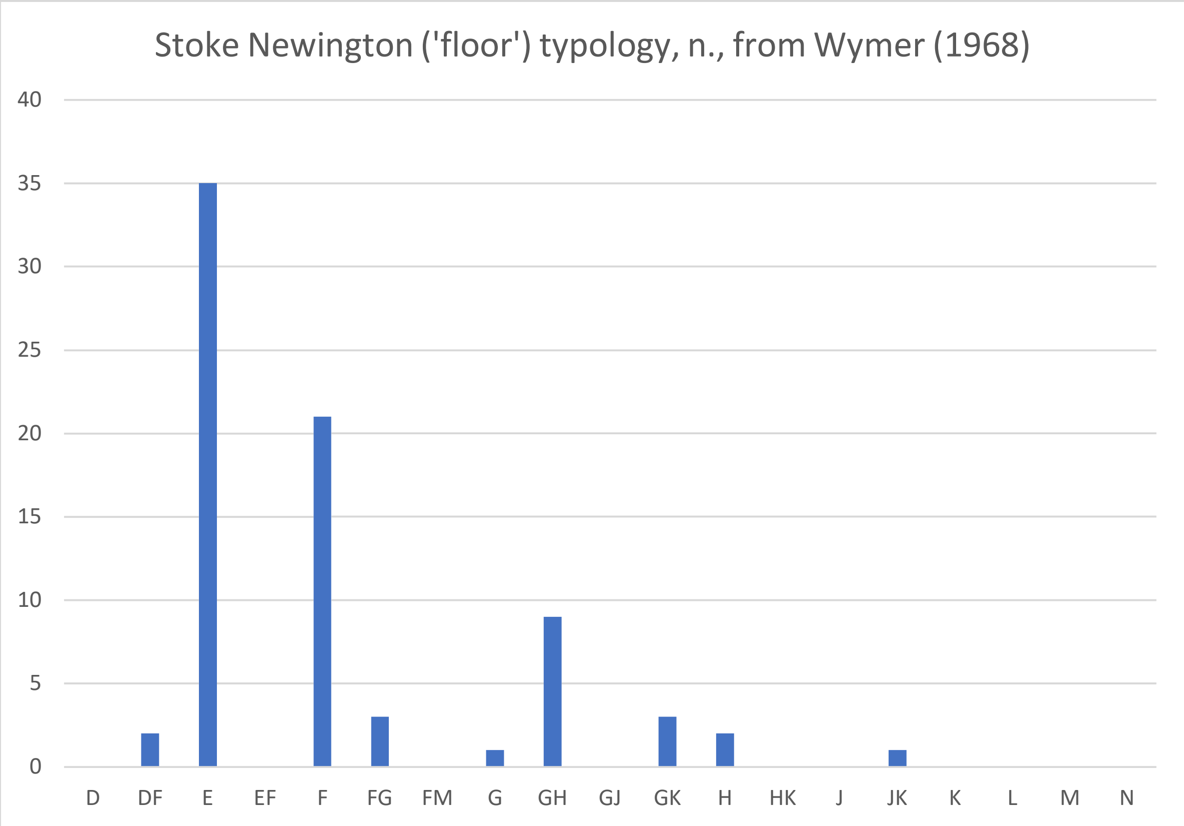


Figure 3.4.2 Stoke Newington ('floor') typology, based on the fresher portion of Wymer's sample (Wymer 1968).

In contrast to the 'floor', little attention has been paid to the archaeology derived from the basal river gravels. Smith (1882b) identified two industries within this gravel; a 'lustrous, sub-abraded' industry found 'chiefly in the upper parts' and an industry found only in the deepest pits characterised by 'rudely made, massive, deeply ochreous' implements. Wymer's attempt to capture the gravel handaxe assemblage based on selecting handaxes in more-abraded condition, is shown below in figure 3.5.

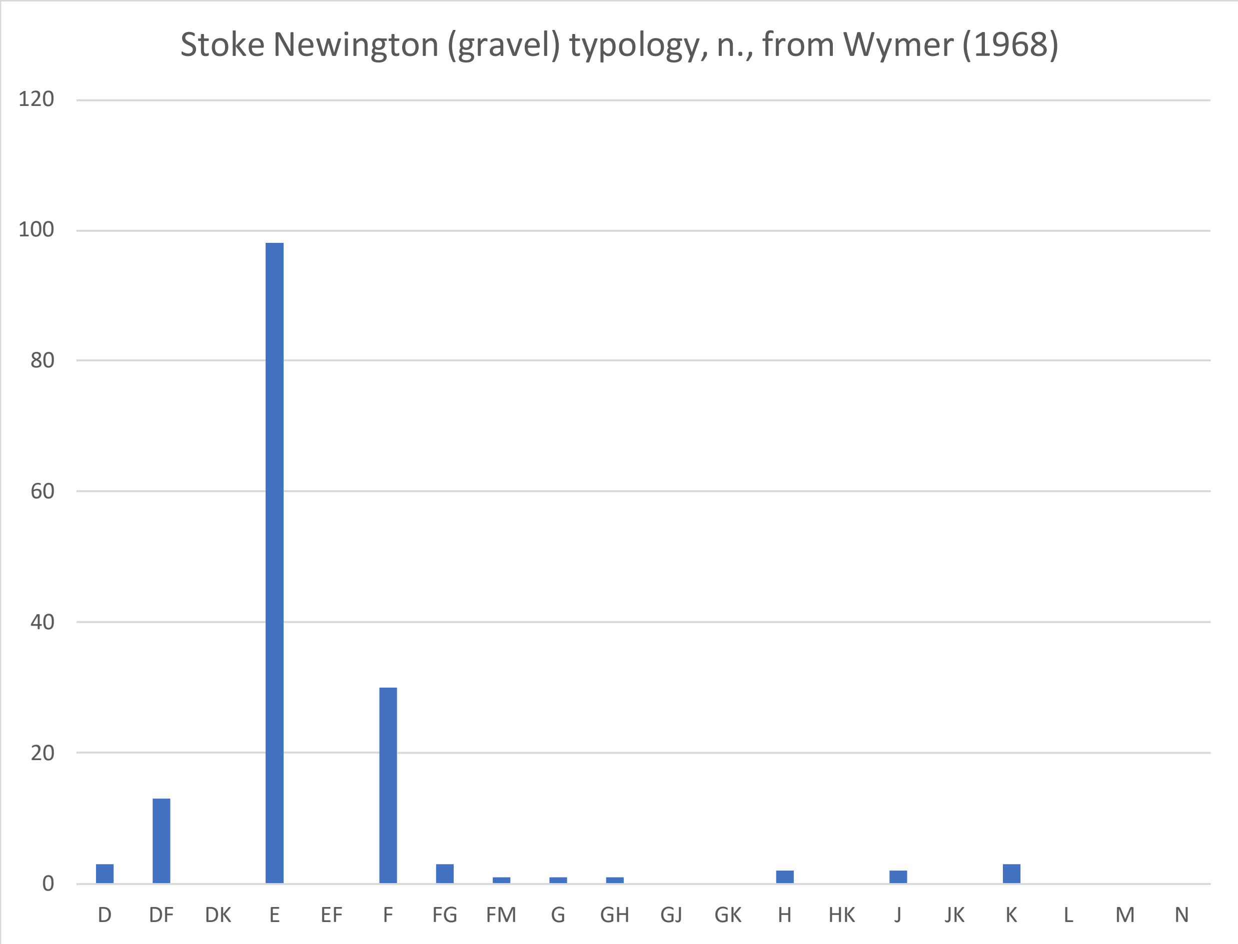


Figure 3.5.3 Stoke Newington (gravel) typology, based on the more abraded portion of Wymer's sample (Wymer 1968).

The typologies appear to be quite similar, although cleavers (type H) occur more frequently in the fresher (supposed 'floor') material. This observation should be balanced against the fact that Wymer's positively identified sample of 'floor' material contained no cleavers. Collins (1976) suggested that the base of the gravel contained a Clactonian industry based on 38 non-handaxe artefacts found, with an Acheulean industry in the 'level above', following Warren's earlier suggestion of Clactonian material at the site (Warren 1942). The 'Clactonian' industry in this case may be equated with the lowest, rolled industry of Smith (1882b) and mentioned by Wymer (1968), although this would probably not be regarded as Clactonian in the modern sense due to the small assemblage size, and the presence of a discrete non-handaxe signature at Stoke Newington was robustly rejected by Rawlinson (2021).

Sample.

A total of 272 handaxes from Stoke Newington were measured, provenanced to Stoke Newington Common (n=162), Geldeston Road (n=75), Cazenove Road (n=5), Graham Road (n=5), Sovereign Lane (n=3), Hampton Park (n=2) and Stoke Newington (no fixed provenance) (n=20). The handaxes from Geldeston Road are from the Warren Collection; the rest are from the W.G. Smith Collection. All the measured handaxes are held in the BM.

3.2.3. SOUTH WOODFORD, Greater London (TQ 408 905).

Site history.

Palaeolithic archaeology was discovered during road works associated with the construction of the M11 motorway: the unexpected discovery of a pristine handaxe led to a watching brief, and a subsequent rescue excavation, beginning in April 1975 (White et al., 1998). Parallels have been drawn between this site and Worthington Smith's more widespread 'Palaeolithic floor' at Stoke Newington (see above e.g., Smith 1879, 1894).

Geology and Stratigraphy.

Three depositional episodes were recorded in the sediments: a lower river gravel, a middle brickearth, and an upper river gravel. The handaxes were found throughout the lower gravel (White et al., 1998). Incipient patination on one handaxe suggested deposition on a stable land-surface occasionally inundated with silt-laden floodwaters, potentially in a warm climate (Wymer, 1977).

Biostratigraphy.

The acidic groundwater conditions at South Woodford, caused by the underlying London Clay, precluded organic preservation (Betts 1975; Wymer 1977).

Terrace stratigraphy.

The site lies within terrace gravels of the river Roding, a north-bank Thames tributary. The archaeology was concentrated in what has been interpreted as the gently sloping inside bend of a meander in the ancient Roding. The altitude of the deposits (20.75 – 23m O.D.) strongly suggests correlation with the Lynch-Hill/Corbets-Tey formation, which outcrops locally at Wanstead Flats and Ilford (Wymer 1968, 1977).

Archaeology review.

Two separate archaeological assemblages were present at South Woodford; a rolled series of six derived flakes found deep within the basal gravel, and a fresh series of nine flakes, six complete or partial handaxes, and one handaxe tip from the surface of the lower gravel at the base of the brickearth. These latter were found in a thin spread over 36m^2, leading to the interpretation of the 'sharp' series as a Palaeolithic activity floor (Wymer, 1977). The handaxes were produced on flint from both river cobbles (available locally), and from chalk-derived sources, the nearest of which is around 18km distant (Dartford or Purfleet; Wymer, 1977). This suggests unusually long-distance raw material transportation (c.f. Feblot-Augustins, 1993). Microscopic use-wear analysis of the handaxes showed butchery use (meat polish), but macroscopic edge damage, incipient cones of percussion and broken tips are suggestive of a more forceful use, possibly in disarticulating carcasses (Mitchell n.d.; Wymer 1977). Keeley (1980) interpreted this as evidence of a butchery site. White et al. (1998) presented four possible interpretations of the site:

1. An *in situ*, heavy duty butchery site where handaxes were used but not produced. Some repairs may have been carried out, explaining the small number of thinning flakes.

2. A lag-gravel deposit, where smaller components were winnowed out leaving only a few large bifaces and smaller flakes which had become trapped in the gravel. Edge-damage was due to hydraulic action and sediment pressure.

3. A final-stage manufacturing site, where largely complete pre-forms (roughouts) were imported for the final few removals before use as in option 1.

4. The feather-edge of a larger site, which was only partially exposed during the excavations.

White et al., (1998) favoured the interpretation of the site as a single-use butchery location but note that incomplete understanding of the taphonomic processes involved preclude any certainty in this regard.

Sample.

The South Woodford handaxe assemblage is currently in the care of Mark White (Durham University). The small size of the assemblage makes standard morphometric analysis of the site redundant; instead, a summary of observations, along with principal metrics and indices, are shown below in table 3.5 and 3.6.

Table 3.5. Principal metrics, South Woodford.

Handaxe	L (mm)	B (mm)	Th (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	L1 (mm)	Wt (g)
1	132	89	43	46	86	14	37	32	452

2	62	51	25	28	48	13	25	30	71
3	132	86	41	71	74	15	35	62	431
4	151	89	38	54	83	15	34	61	376

Table 3.6. Principal shape-descriptive indices, South Woodford.

Handaxe	B/L	Th/B	B1/B2	T1/T2	L1/L	Shape (Roe, 1968)
1	0.674	0.483	0.534	0.378	0.242	P
2	0.822	0.49	0.583	0.52	0.483	o
3	0.654	0.476	0.959	0.428	0.471	o
4	0.589	0.426	0.65	0.441	0.238	p

Typologically, the assemblage consists of a thick-butted point (type F) with a missing tip and possible tranchet removal, a small plano-convex thick-butted ovate (type E or K), a large ovate-cleaver uniface with a flat transverse tip and up to 20 incipient cones of percussion on one face (type HK), and a large sub-cordate (type GJ) with chalky residual cortex suggesting a non-local origin. The four complete handaxes are shown in figure 3.6 (after Wymer 1985).

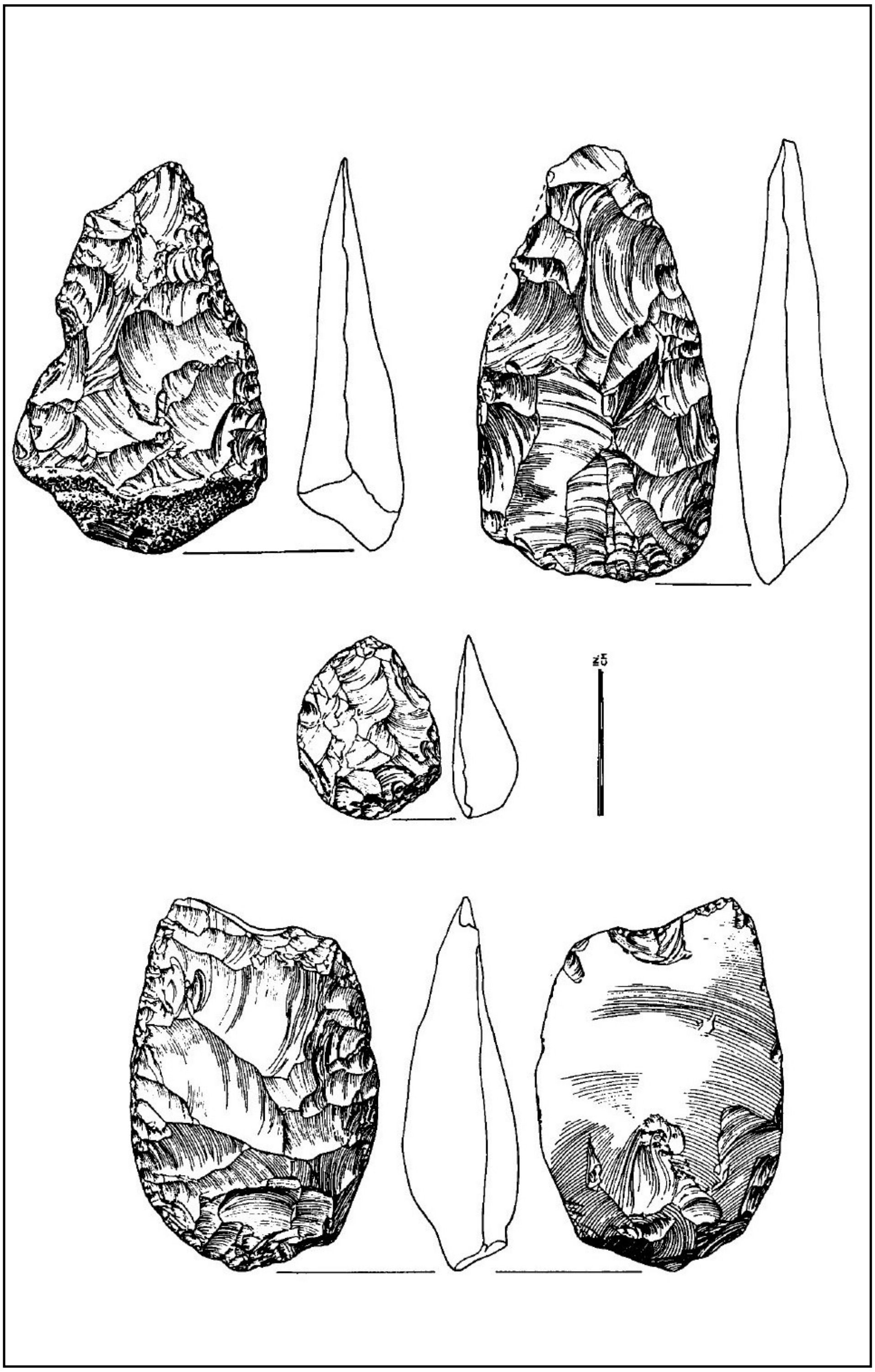


Figure 3.6.4 The four complete South Woodford handaxes, after Wymer (1985).

3.2.4. LOWER CLAPTON (TQ 355 856).

Site history.

A handaxe was found at Lower Clapton on Dunlace Road by J. Anscombe at some point between 1868 – 1878, making it one of the first palaeoliths found in London (Smith 1879; Wymer 1968). The Lower Clapton deposits are viewed as a continuation of the more famous Stoke Newington deposits (Wymer 1968). Most of the handaxes from Lower Clapton were given no exact provenance. The area is now entirely developed.

Geology and Stratigraphy.

Wymer (1968) speculated that some of the fresher implements may have originated from preserved land surfaces (i.e., 'floors' in the Stoke Newington sense) within the 'brickearth', although his use of the term in the latter case is unclear and he may have been referring to the fine-grained fluvial sediments in which the Stoke Newington 'floors' were found.

Terrace stratigraphy.

The area of Lower Clapton is mapped as Hackney Gravel, a deposit associated with the Lynch Hill terrace (Wymer 1968), although the nature of the relationship between the two features is unclear. The Hackney Gravel has been re-mapped as an additional, intermediate 'Hackney Terrace' (Royse et al., 2012), a feature which appears on the riverward side of the Lynch Hill terrace, implying both a lower heigh O.D., and a relatively older age. Bridgland (2014) argued against the treatment of the Hackney Gravel as a distinct terrace, based on the work of Ellison et al., (2004) who had identified the base of the Hackney Gravel at a lower altitude O.D. than the Lynch Hill Gravel, whilst also suggesting that both the Hackney and Lynch Hill Gravels could well represent parts of a single deposit. In this, they agreed with Bridgland's earlier position that the 'Hackney Member' was part of the locally complex Lynch Hill Terrace (Bridgland 1994, 1995; also noted by Green et al., 2004, 2006). Bridgland further suggested that outcrops of the Hackney Gravel might represent a deeper and narrower incision into the bedrock prior to the Phase 2 aggradation, suggesting that they represent an earlier part of the MIS 10 – 8 cycle (Bridgland et al., (2019).

Archaeology review.

Roe (1968b) recorded artefact numbers from Lower Clapton held in UK museums, shown in figure 3.7.

Table 3.7. Lower Clapton Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	**Handaxes (including roughouts)**	**Cores and flakes**	**Levallois cores and flakes**
Lower Clapton	180	283	5
TOTAL	180	283	5

Juby (2011) noted that the artefacts from Lower Clapton (along with the nearby areas of Shacklewell and Hackney Downs) generally showed 'moderate abrasion' as opposed to the generally 'slight abrasion' observed on some of the supposed 'floor' artefacts from Stoke Newington. This is potentially a consequence of the Palaeolithic 'floor' being more prevalent at Stoke Newington (although see the discussion above on the condition of the 'floor' artefacts). Roe (1981) made a similar observation, suggesting that a greater proportion of the Lower Clapton archaeology was derived from the basal gravels underlying the 'floor'. Wymer (1968) provided a typological analysis of the handaxes from Lower Clapton, shown below in figure 3.7.

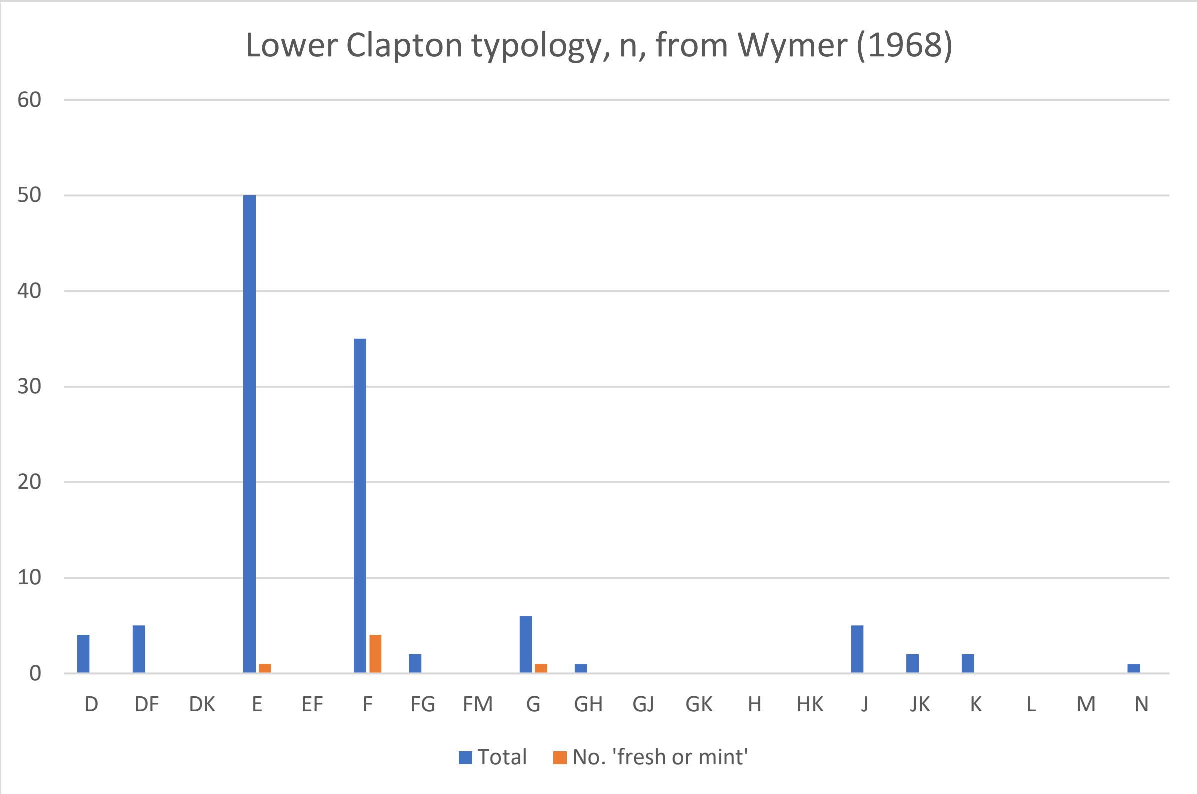


Figure 3.7.5 Lower Clapton typology (Wymer 1968).

Sample.

A total of 51 handaxes from Lower Clapton were measured. The handaxes from Lower Clapton are from the Sturge (ex. W.G. Smith) Collection. All the measured handaxes are held in the BM.

3.2.5. LONDON BOROUGH OF HILLINGDON (centred on Yiewsley (TQ 071 805) and West Drayton (TQ 080 800)).

Site history.

Gravel pits were operating in the London Borough of Hillingdon since the late nineteenth century and continued to operate until at least the 1960s, when they were visited by J. Wymer (Wymer

1968). The pits were clustered around Yiewsley (TQ 071 805) and West Drayton (TQ 080 800) as well as smaller numbers in Dawley (TQ 085 804), all of which were thought to occur on the same continuous spread of terrace gravel and brickearth (Wymer 1968). Collections of handaxes were made by J. Allen Brown, R. Garraway-Rice and J.G. Marsden, but the area is far better known as one of the more prolific sources of Levallois material in the Middle Thames (Ashton et al., 2003).

Geology and Stratigraphy.

Brown (1895) illustrated the stratigraphy from Eastwood‘s (Sabery's), Pipkin‘s, Odell‘s and Maynard‘s Pits. This showed a relatively thin deposit of stratified gravel, overlaid by a thicker bed of unstratified gravel, capped with brickearth.

Terrace stratigraphy.

Wymer (1968) considered the various Hillingdon deposits to be a 'continuation' of the deposits at Iver on the Lynch Hill terrace, although Juby (2011) outlined a more complex terrace stratigraphy in the area based on the work of Collins (1978) and Gibbard et al. (1987).

Archaeology review.

Roe (1968b) recorded artefact numbers from the Hillingdon area held in UK museums, shown in table 3.8. Note that some pits are recorded as being in different localities, presumably depending on the naming conventions of the collector (e.g., Eastwood's Pit is in both West Drayton and Yiewsley).

Table 3.8. London Borough of Hillingdon Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Hillingdon (general)	30	8	2
Hillingdon (Chapel Lane)	1	4	0
Hillingdon (Eastwood's Pit)	7	2	2
Hillingdon (Little Wonder Pit)	0	2	0
Hillingdon (Town Pit)	2	0	0
West Drayton (general)	179	82	26
West Drayton (Bowyer's Pit)	18	3	0
West Drayton (Eastwood's Pit)	54	10	8
West Drayton (other named pits)	12	15	15
Dawley (General)	236	60	11

Dawley (Maynard's Pit)	262	47	4
Dawley (Odell's Pit)	86	26	12
Dawley (other named pits)	6	3	0
Yiewsley (Eastwood's Pit)	543	515	117
Yiewsley (General)	118	58	17
Yiewsley (Boyer's Pit)	415	221	187
Yiewsley (Clayton's Pit)	21	49	17
Yiewsley (Maynard's Pit)	25	11	0
Yiewsley (Wallington's Pit)	22	4	2
Yiewsley (other named pits)	38	96	4
TOTAL	2075	1216	424

There was a suggestion that at least some of the handaxes originated from the base of the stratified gravels (Brown 1895). Handaxes were typically found in abraded condition, but Brown (1895) collected a few fresher examples. Several of these fresher examples originated from a thin seam of clay at 5.79-6.09m depth (Brown 1895; Juby 2011). What little attention has been paid to the Hillingdon pits has generally been expended on the relatively prolific Levallois technology found in the area, although the Levallois material almost certainly occurred on the surface of the Lynch Hill terrace and therefore post-date the handaxes (Wymer 1968; Ashton et al., 2003; Scott et al., 2010). Likewise, two *bout coupé* handaxes provenanced to the region of Hillingdon on the Lynch Hill terrace (Eastwood's Pit, Clayton's Pit) are likely to have originated from the overlying drape of brickearth rather than the terrace gravels (Tyldesley 1987; White & Jacobi 2002). Wymer's typological analyses for both Hillingon (n.f.p.) and Dawley are shown below (figures 3.8 and 3.9 respectively).

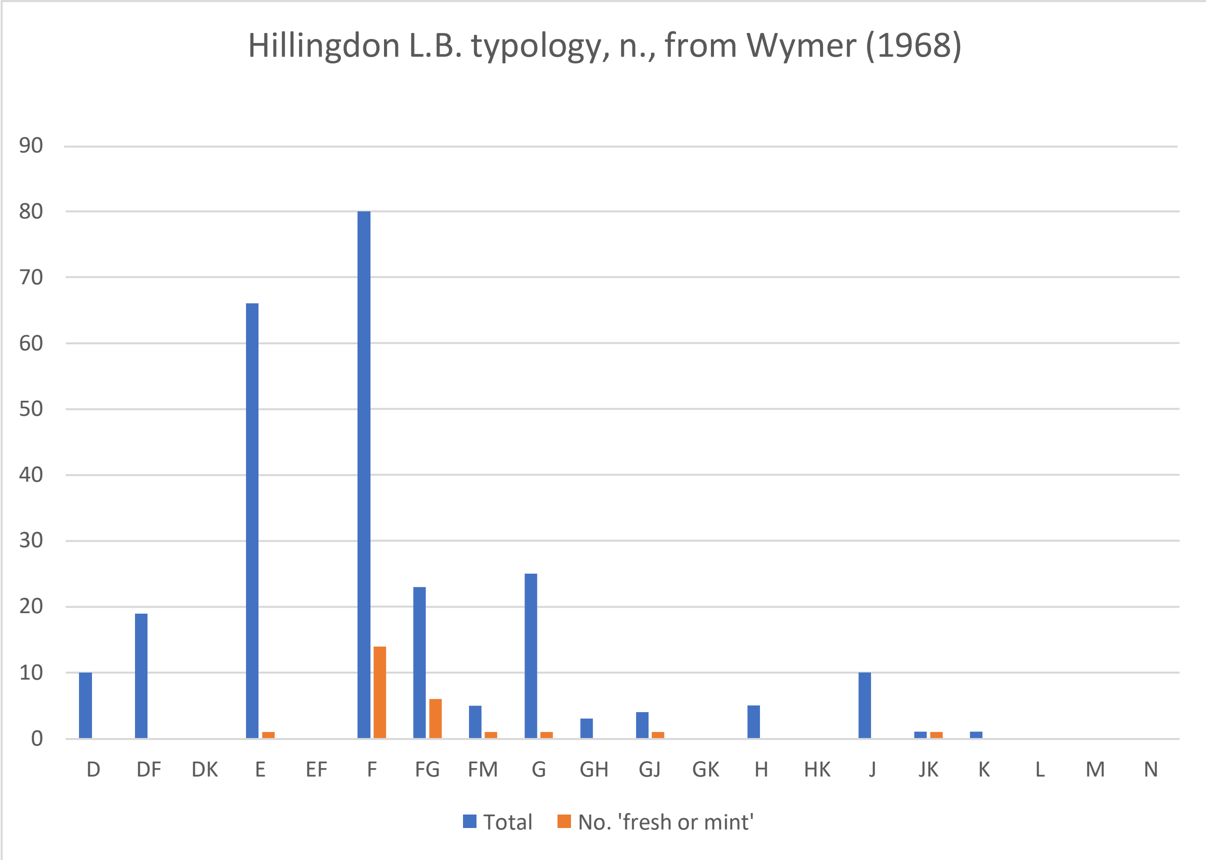


Figure 3.8. Wymer's (1968) typological analysis of handaxes from Hillingdon lacking specific provenances.

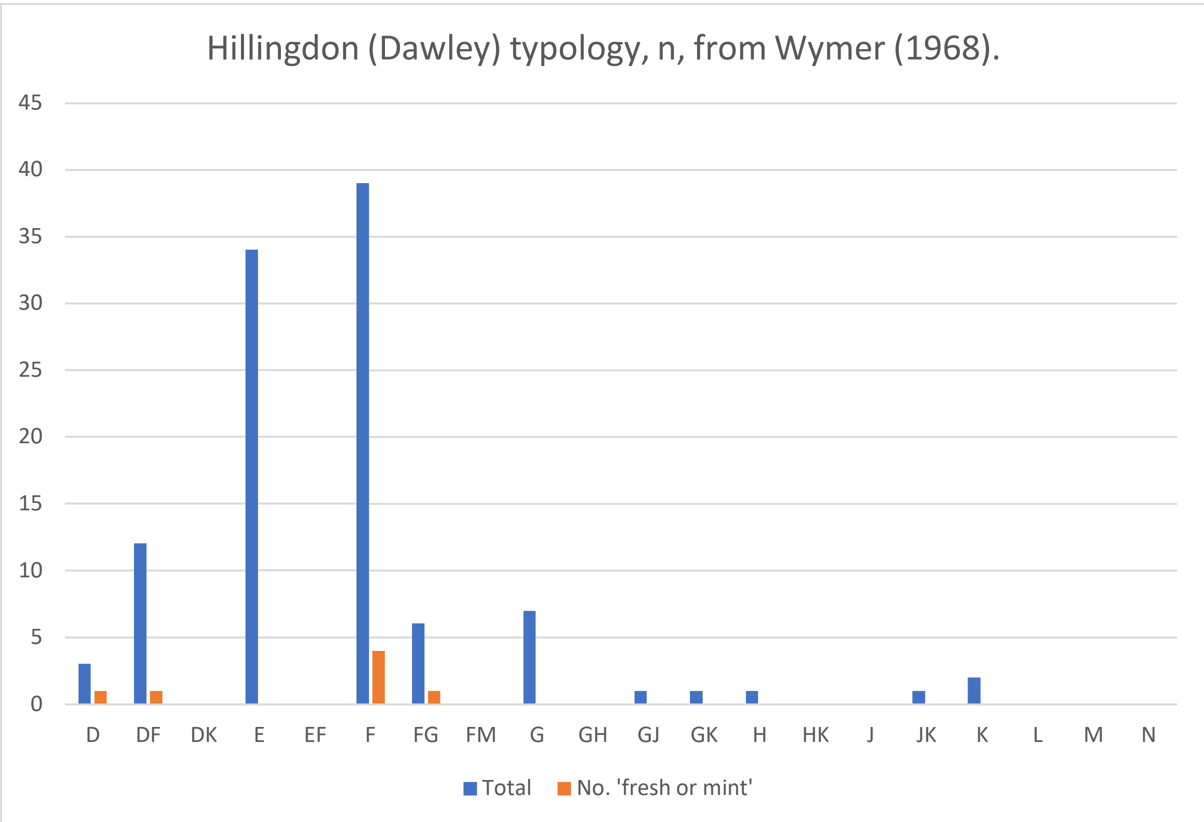


Figure 3.9.6 Wymer's (1968) typological analysis of handaxes from Dawley in Hillingdon L.B.

Sample.

A total of 107 handaxes from Hillingdon L.B. were measured, primarily from the BM (various collections but mostly Garroway-Rice, n=103) and the ROM (Treacher collection, n=5). This study follows Wymer (1968) in considering the various pits in the London Borough of Hillingdon together. This approach can be supported by comparing Wymer's Hillingdon (n.f.p.) data with his data from Dawley, which show very similar typological patterns. In addition, the number of handaxes from each individual pit would be too small to allow for satisfactory morphometric and typological comparison, as shown in table 3.9. The greatest proportion of handaxes originated from Eastwood's (formerly Sabery's) Pit, Yiewsley.

Table 3.9. The provenances of the Hillingdon L.B. sample.

	Odell's Pit	Maynard	Boyer's Pit	Western Cartage Co. Pit	Clayton's Pit	Eastwood's Pit (Saberys Pit)	Yiewsley n.f.p.	Hillingdon L.B. n.f.p	West Drayton n.f.p	TOTAL
no.	2	7	9	2	3	33	24	9	18	107

3.2.6. LEYTON, LEYTONSTONE AND SEVEN KINGS (around TQ 390 873).

Site history.

The wide area covered by Leyton, Leytonstone and Seven Kings produced a moderate number of palaeoliths in the late nineteenth and early twentieth centuries, the major collectors being Worthington Smith, Hazzledine Warren and Frank Corner. Worthington Smith made a distinction between 'Leyton' and 'Leytonstone', but the former name has been used to cover both areas and 'the same gravel spread' is present in both areas (Wymer 1968).

Geology and stratigraphy.

No geological description is published for Leyton, although Seven Kings (Ilford) was the target of coring in 1959 (published in West et al., 1964). West and colleagues recorded the presence of a Pleistocene sequence overlying London Clay at around 3.05m (10') O.D., consisting of a basal sand overlaid by an organic horizon (preserving molluscan and pollen fossils), overlaid in turn by brickearth. The organic muds, found at around 6.71m (22') O.D., perhaps pointed to a temperate climate, although the fragmented condition of the molluscan fossils makes this interpretation equivocal. Regrettably, the stratigraphic position of much the artefact assemblage (or indeed, the relationship between Seven Kings and the far more prolific Leyton deposits) is unclear.

Terrace stratigraphy.

Seven Kings Station is situated on Hackney Gravels, which form part of the Lynch Hill terrace locally (Wymer 1968; Taylor 2019). Bents Farm, Leyton is likewise situated on Hackney Gravels; Protheroe's Nursery, Leyton, is situated on Lynch Hill terrace gravel (Wymer 1968; Taylor 2019). Both deposits form part of the Lynch Hill – Corbets Tey terrace, securely dated to MIS 10 – 8.

Archaeology review.

Roe (1968b) provided artefact numbers from Leyton and Leytonstone held in UK museums, shown in table 3.10.

Table 3.10. Leyton and Leytonstone Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Leyton (general)	42	18	1
Leyton (other)	3	2	0
Leytonstone (general)	36	9	0
Leytonstone (Bents Farm)	14	8	0
Leytonstone (other)	1	0	0
TOTAL	96	37	1

Seven Kings was not a prolific area for Palaeolithic archaeology; Taylor (2019) figured a large ficron handaxe (238mm), possibly from the area of Seven Kings station, and the author recorded a single distinctly lopsided handaxe with a missing tip in the BM (possibly type FG or FM); Roe (1968b) recorded only a single handaxe from the area.

The areas of Leyton and Leytonstone are rather more prolific, although most of the artefacts from these areas have only a 'general' provenance. Taylor (2019) provided a detailed analysis of a modest collection of handaxes from Bent's Farm collected by Dr Frank Corner and currently held by the Croydon Natural History & Scientific Society (CNHSS). Taylor made the interesting observation of pronounced 'notching' towards the tip on two pointed handaxes in this collection (one of which is shown in figure 3.10), which they suggested may have had a functional purpose (such as levering up animal hides for cutting).

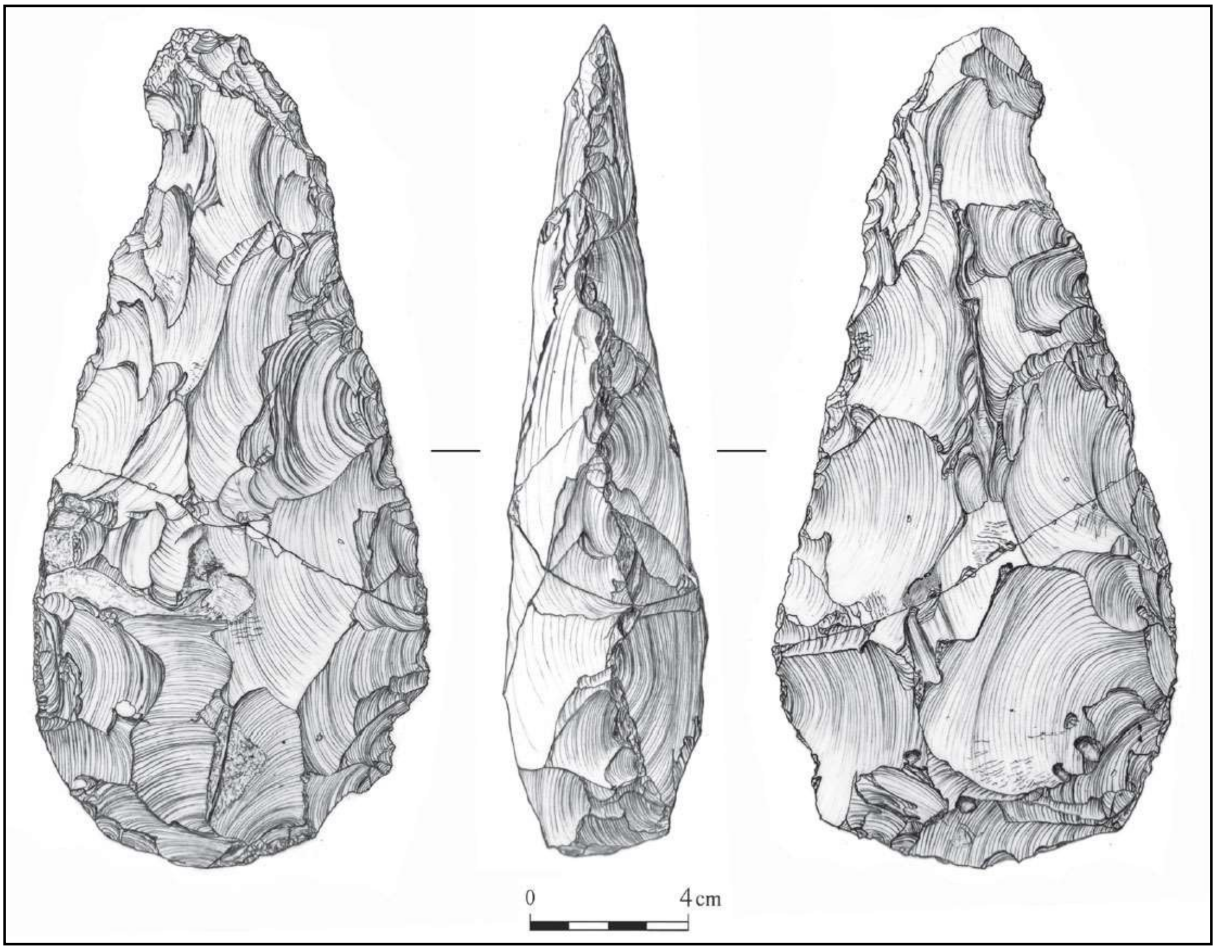


Figure 3.10 A well-made 'notched' handaxe from Leytonstone. From Taylor (2019) Fig. 4, p.10.

Both Taylor and Roe (1981) considered the handaxes to be attributable to Group I based on their appearance. Taylor (2019) reported that several of the artefacts from the CNHSS collection were given stratigraphic provenances, indicating depths between 2.4 – 2.7m. Minutes of the Essex Field Club noted that artefacts from depths of around 1.8m were rolled, whereas those from around 2.7m were less rolled (Anon. 1903 in Taylor 2019). The Minutes suggested that the deeper strata appeared to be a 'living floor', inviting clear parallels with Worthington Smith's 'Palaeolithic floor' (Smith 1894), although Taylor (2019) urged caution in drawing conclusions based on artefact condition alone.

Wymer (1968) provided a typological analysis of handaxes from Leyton, shown below in figure 3.11.

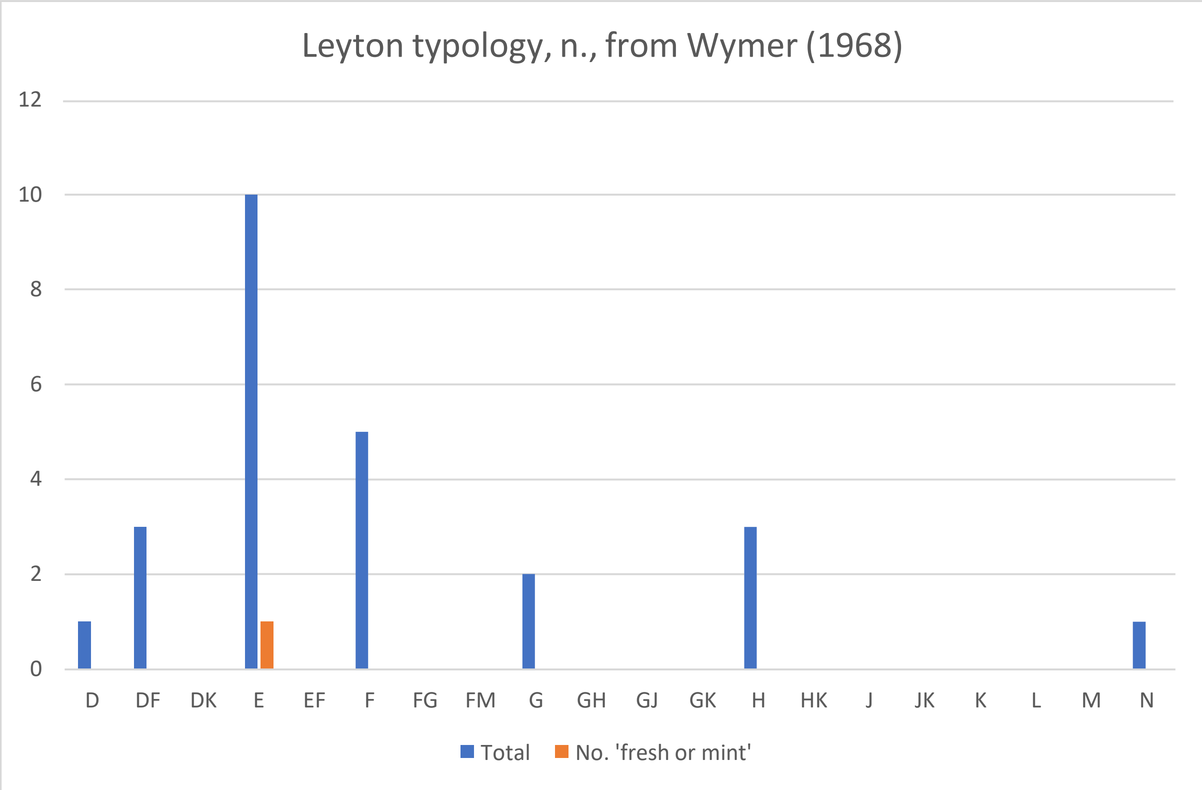


Figure 3.11. Wymer's (1968) typological analysis of handaxes from Leyton.

Sample.

A total of 75 handaxes from Leyton and Leytonstone were measured, primarily from the BM ex. Institute of Archaeology, Sturge and other smaller collections (n=72) and the ROM H. Lloyd collections (n=3).

3.3. The Middle Thames.

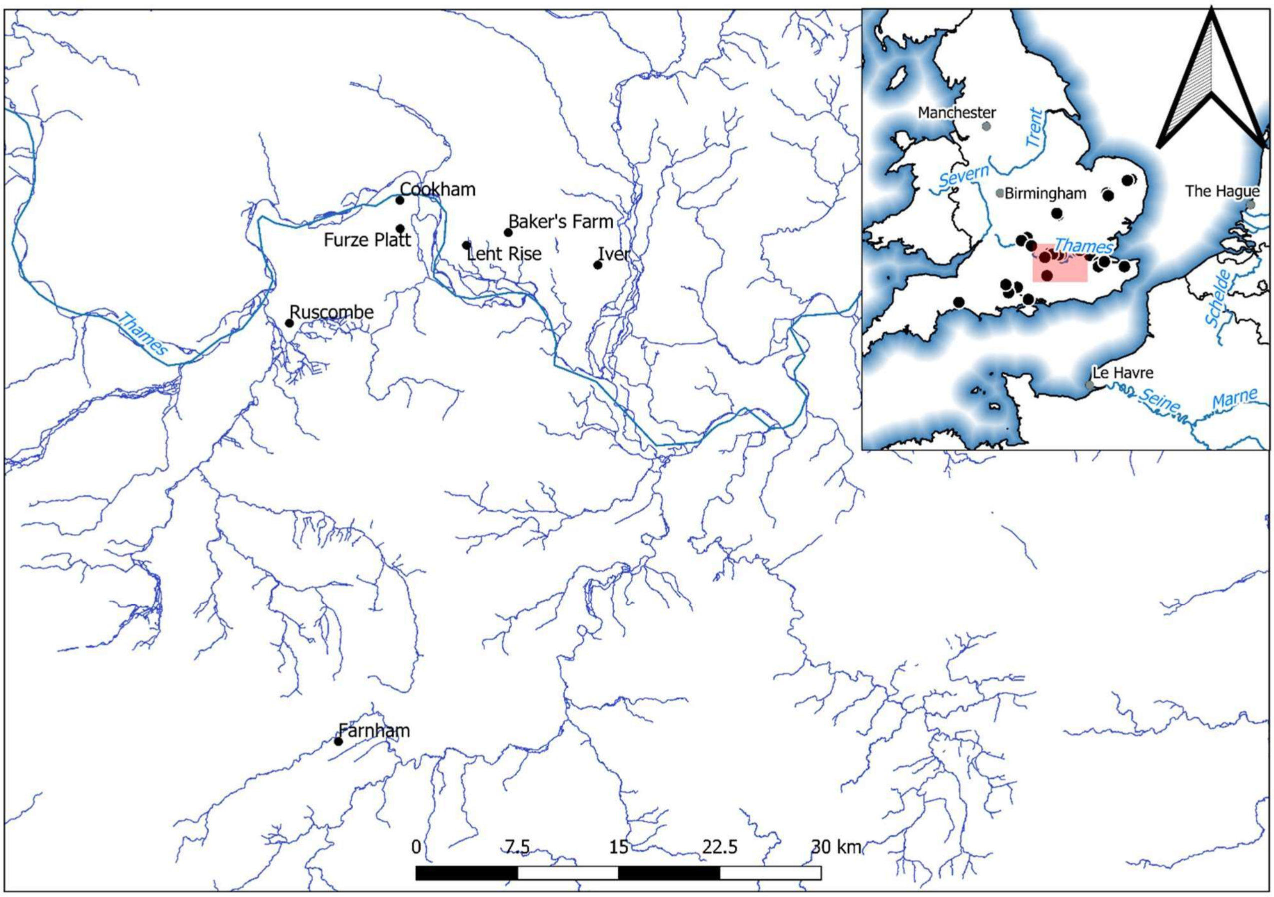


Figure 3.12. Middle Thames map.

3.3.1. BAKER'S FARM, Buckinghamshire. (SU 878 852).

Site History.

Baker's Farm was particularly productive in the inter-war period before being entirely built over by around 1939 (Lacaille 1940; Wymer 1968; Cranshaw 1983). The pit was worked in a 'somewhat desultory' fashion by two workmen excavating by hand (Cranshaw 1983). Ll. Treacher and A.D. Lacaille were the principal collectors from the site. Lacaille (1940) provided the last and most comprehensive descriptions of the site, following the geological observations of Breuil (1932).

Geology and Stratigraphy.

The pit was around 4.57 m deep and was floored by Reading Sands, which were usually waterlogged (M. Treacher (n.d.) in Cranshaw 1983). Lacaille (1940) published a photograph highlighting the stratigraphy at Baker's Farm (figure 3.13, below, showing a section parallel to the axis of the Thames valley), and described the deposits as:

1. Stratified but poorly sorted fluviatile gravels.
2. Solifluction deposits.
3. Brickearth
4. Topsoil.

The artefacts originated from the bottom 2.44m of the deposits, within the fluviatile gravel.

Figure 3.13. The strata at Baker's Farm, numbered and described in the text below. From Lacaille (1940).

Terrace stratigraphy.

Lacaille (1940) described Baker's Farm as being situated at the margin of the Lynch Hill terrace near the bluff dropping to the level of the Taplow terrace. The bluff itself was around half a mile wide (Hare 1947), and Cranshaw (1983) considered it possible that Baker's Farm pit exploited gravels reworked into the bluff, based on the observation that ficron handaxes, which were generally found in good condition at nearby Furze Platt, were 'with few exceptions, broken and abraded' at Baker's

Farm.

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Baker's Farm held in UK institutions. These are shown in table 3.11.

Table 3.11. Baker's Farm Pit Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Baker's Farm	410	298	5
TOTAL	410	298	5

Lacaille (1940) considered Cannoncourt Farm Pit, Baker's Farm Pit and Lent Rise to be comparable in character. At all three sites, he identified a distinct 'derived' handaxe series and a fresher handaxe series, an observation supported by subsequent work. He characterised the 'derived' component as occurring in a range of conditions and including crude and boldly flaked handaxes. Along with these he grouped most of the flakes, flake tools, and some of the better made handaxes. The fresher series was comprised of better-made 'St. Acheul' types only, which he believed to have been deposited contemporaneously to the formation of the gravel. Lacaille considered the handaxes at Baker's Farm, Cannoncourt Farm Pit and Lent Rise to be exceptionally large and heavy-duty, including 'elementarily flaked side-choppers' (perhaps analogous to Wymer's 'Type L' Segmental Choppers or to 'chopper cores' of the Clactonian type).

The observations Lacaille (1940) made relating *specifically* to Baker's Farm are more limited; he noted the tendency for handaxes to be produced on nodular or tabular flint with a high degree of cortex retention, and that the abundant Baker's Farm cleavers tended to be somewhat narrower than other Middle Thames Lynch Hill terrace sites. Roe (1968a) analysed 236 handaxes from the Oxford University Museum (Treacher Collection), including only handaxes he judged to be in 'fresh or only slightly worn' condition and thus presumably eliminating Lacaille's derived series. The site was added to Roe's Group I. Wymer (1968) also analysed artefacts from the Oxford University Museum (Treacher collection), which included 148 complete handaxes (figure 3.14). He found an assemblage dominated by crude types with a significant number of well-made points and cleavers but relatively few ficrons. Wymer also recorded a single Levallois core, along with flakes and formal flake tools. In the latter category he included worked flakes 'resembling [a] hand-axe' (n=4) and 'resembling [a] cleaver' (n=2). Wymer found most of the artefacts of all types to be rolled, with only

32.5% in his ‘sharp’ or ‘mint’ categories. True points and ficrons tended to be better represented in the ‘sharp or mint’ categories, whilst crude types and cleavers were notably less prominent. This is seemingly at odds with Cranshaw’s (1983) observation of the ficrons as being largely broken, however Wymer’s analysis considered only complete handaxes. Wymer also noted a rare example of a ‘recycled’ handaxe with two distinct phases of working.

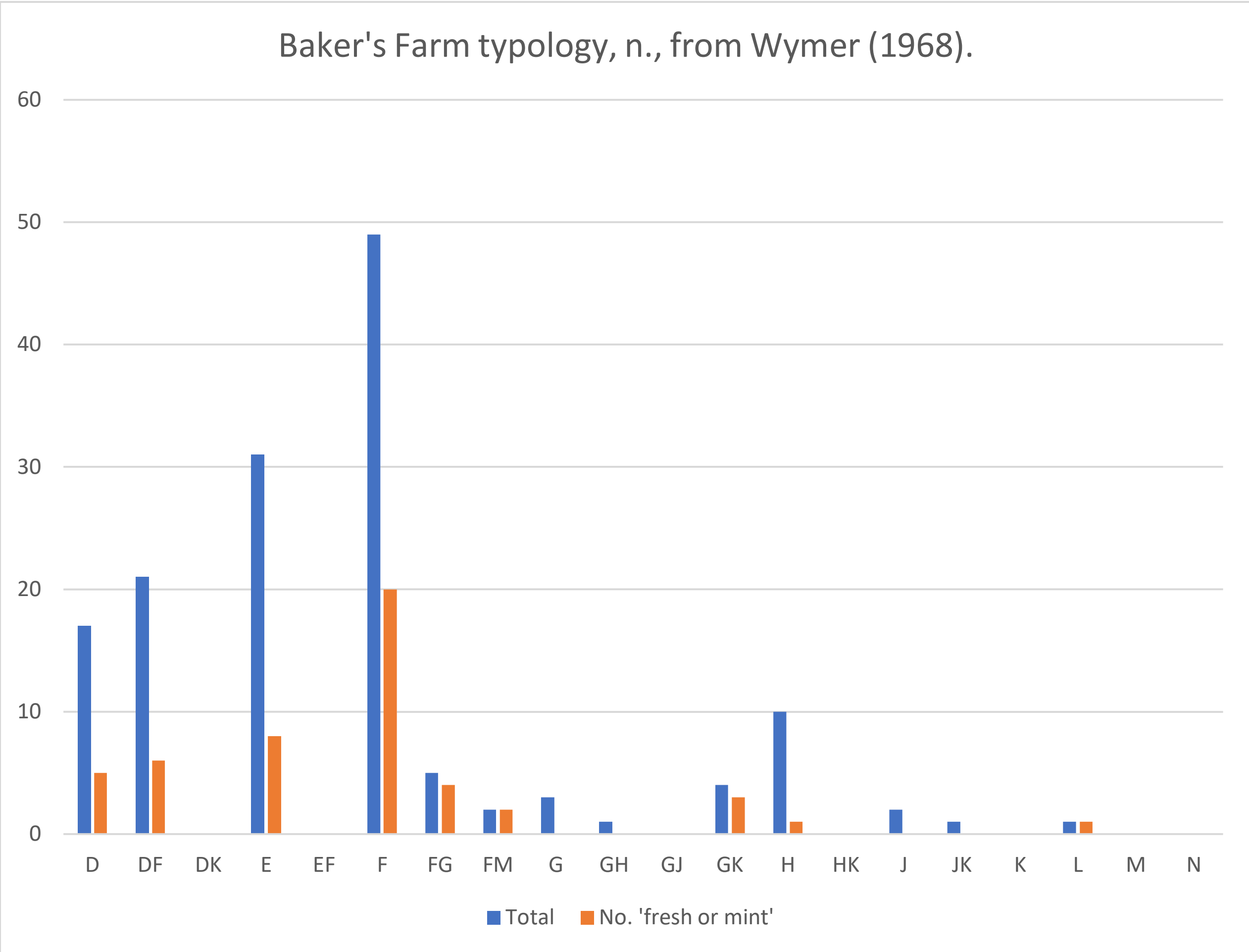


Figure 3.14.7 Wymer's (1968) typological analysis of handaxes from Baker’s Farm.

Cranshaw’s (1983) study was primarily a comparison of handaxes from Treacher’s Baker’s Farm and Furze Platt collections. Her analysis was exhaustive, particularly regarding the metrical characteristics of the ficron and cleaver component of the assemblage. Her conclusions are outlined fully in the section on Furze Platt, below.

Sample.

32 handaxes were analysed in this study from the BM Lacaille collection (n=26) and the PRM Underhill collection (n=6). Whilst the sample presented here is small relative to the number of

handaxes found at the site, it represents the addition of two unstudied samples to previous analyses of the site which have almost exclusively focussed on Treacher's collections.

3.3.2. COOKHAM, Berkshire. (SU 878 852).

Site History.

Early collections were made by Ll. Treacher, who also provided brief descriptions of the various pits in the area of Cookham Dean village and their palaeolithic contents (Treacher & Allen 1897). W. Smith and others also collected from the pit (Wymer 1968). The pits were entirely covered over and had reverted to farmland by 1957, with the exception of Lower Mount Farm Pit which provided Wymer with the opportunity to make observations (Wymer 1968). Artefacts are generally not well provenanced, variously recorded as 'Cookham', 'Cookham Dean', and 'Cookham Rise'; Roe (1981) believed that most originated from Danefield Pit, but it is clear from Treacher & Allen (1897) that at least two pits were operating in the area.

Geology and Stratigraphy.

Wymer (1968) described a section at Lower Mount Farm Pit, which he considered to be similar to both nearby Danefield Pit and to Cannoncourt Farm Pit, however he observed 'an underlying 8 ft. of loose, sandy current-bedded gravel' which was absent at the former pits. He considered this to be a 'striking illustration' of the lateral variability of deposits within the Lynch Hill terrace. Darby (1909) noted that, whilst artefacts occurred throughout the gravels, they were especially abundant in the lower part. This suggests interesting parallels with the nearby localities at Furze Platt where artefacts were also described as being concentrated towards the base of the gravel and at the interface with the underlying geology.

Terrace stratigraphy.

Danefield Pit was situated on a spread of the Lynch Hill terrace 'west of the station, continuing to Maidenhead'; a second spread 'between the railway station and the river' was found to lack archaeology (Wymer 1968).

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from the Cookham area held in UK institutions. These are shown in table 3.12.

Table 3.12 Cookham Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Cookham (general)	401	33	1
Cookham Dene (or Cookham Dean)	10	0	0
Cookham Rise	9	0	0
Cookham (other)	14	2	0
TOTAL	434	35	1

Wymer (1968) produced a typological analysis of 130 Cookham handaxes, principally including objects from Reading and Oxford University Museums (Treacher collection). Wymer's analysis is shown below in figure 3.15.

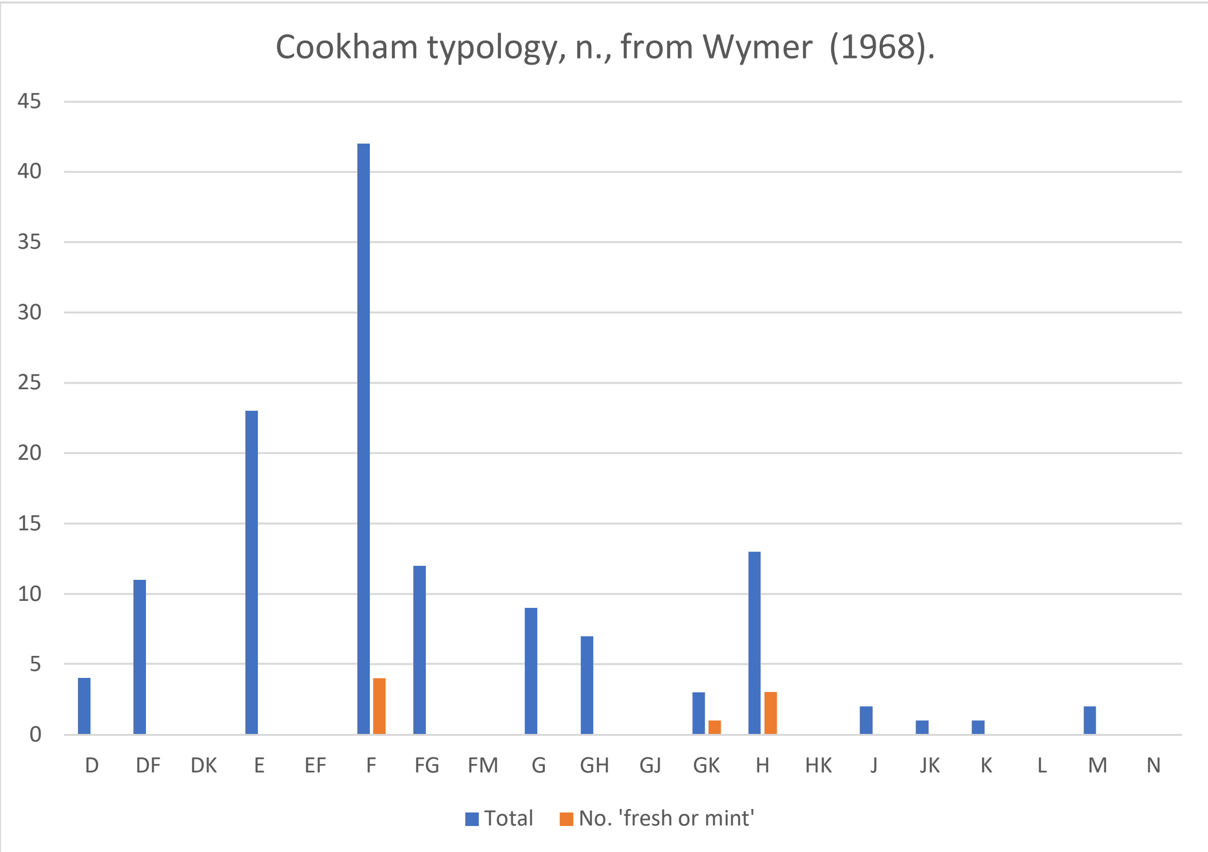


Figure 3.15. Wymer's (1968) typological analysis of handaxes from Cookham.

Aside from the usual pattern of point-dominance with a significant number of crude types, he drew particular attention to the large number of cleavers in his sample, and to the fact that 'almost everything' was in rolled condition. Wymer considered the handaxes to be almost identical to nearby Furze Platt, except in terms of their condition. Roe (1981) considered the assemblage to be 'of Group I character'.

Sample.

123 handaxes were analysed in this study from the CAA Fox collection (n=97) and the ROM Treacher collection (n=26). None of the sample can be provenanced to a specific pit.

3.3.3. FURZE PLATT, Berkshire. (SU 878 831).

Site History.

The pits at Furze Platt (Cannoncourt Farm Pit and Cooper's pit) are a reference site for both the Pleistocene Lynch Hill Gravel of the Middle Thames (Bridgland 1994) and for the palaeolithic contents of those gravels (Roe 1981). The gravel pits at Furze Platt were first described in a handful of brief reports by Ll. Treacher, who also made the first major collections from the site from 1889 until well into the first half of the twentieth century (Treacher 1896a, 1904; Treacher & White 1909). Further geological and archaeological observations were made by A.D. Lacaille, who also amassed a sizable collection of artefacts (Lacaille 1940). Wymer (1968) reported on the site, having cut sections in 1953 – 54. The original pits (and areas immediately to the north) were revisited for geoarchaeological investigation by Harding et al. (1991) and Harding & Bridgland (1999). Geoconservation efforts at the site, including its inclusion as an SSSI, have ensured that undisturbed implementiferous deposits are preserved despite housing development in the former pits (Harding et al. 1991b; Last et al. 2013; Dale et al. 2021).

Geology and Stratigraphy.

Lacaille (1940) described the geology and stratigraphy at Cannoncourt Farm Pit, shown in the figure 3.16, noting that the deposits bore a close resemblance to sections at Baker's Farm and Lent Rise. The numbered strata were described by Lacaille as follows:

1. Poorly stratified sandy fluviatile gravel, possibly fining upwards with large flint and erratic nodules in the lower part.
2. Solifluction deposits.

3. Brickearth
4. Topsoil.

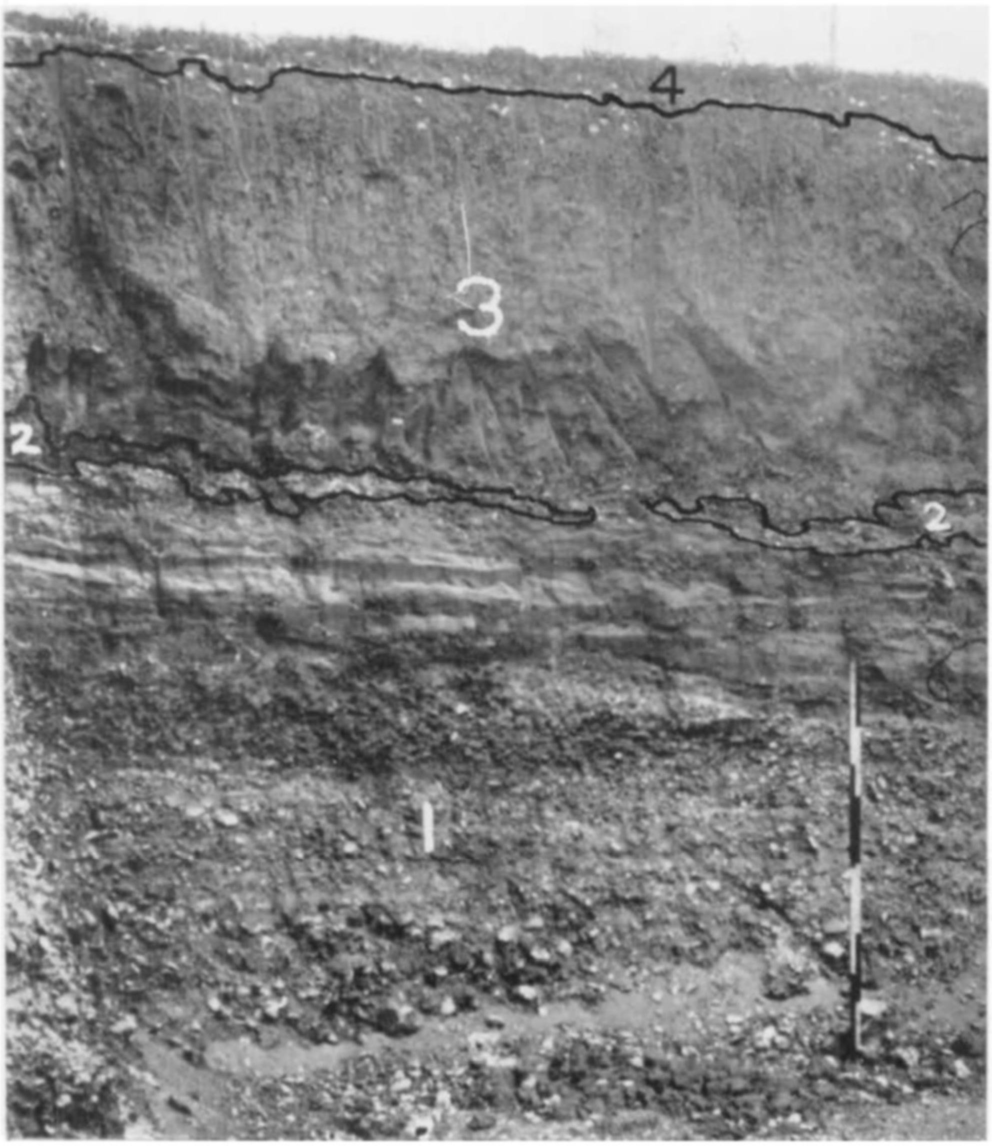


Figure 3.168 A photograph from Lacaille (1940), highlighting the stratigraphy at Cannoncourt Farm Pit.

Cooper's Pit was disused and overgrown by the time Lacaille visited Furze Platt, however he was confident that it belonged to the 'same spread' of gravel and would therefore be largely similar in character. Certainly, Treacher (1896, 1904) noted the same concentration of coarser material in the lower 0.6m of gravel that Lacaille had observed at Cannoncourt Farm Pit.

Harding et al. (1991) and Harding & Bridgland (1999) provided a comprehensive reanalysis of the site geology based on their 1987 GCR fieldwork, the salient details of which will be summarised here. The chalk bedrock surface, which was found to have considerable relief, ranging from scour marks to deep solution pipes (an example of which is shown in a section from Cooper's Pit (figure 3.17)), showed a close similarity to previous descriptions of the geology at Furze Platt.

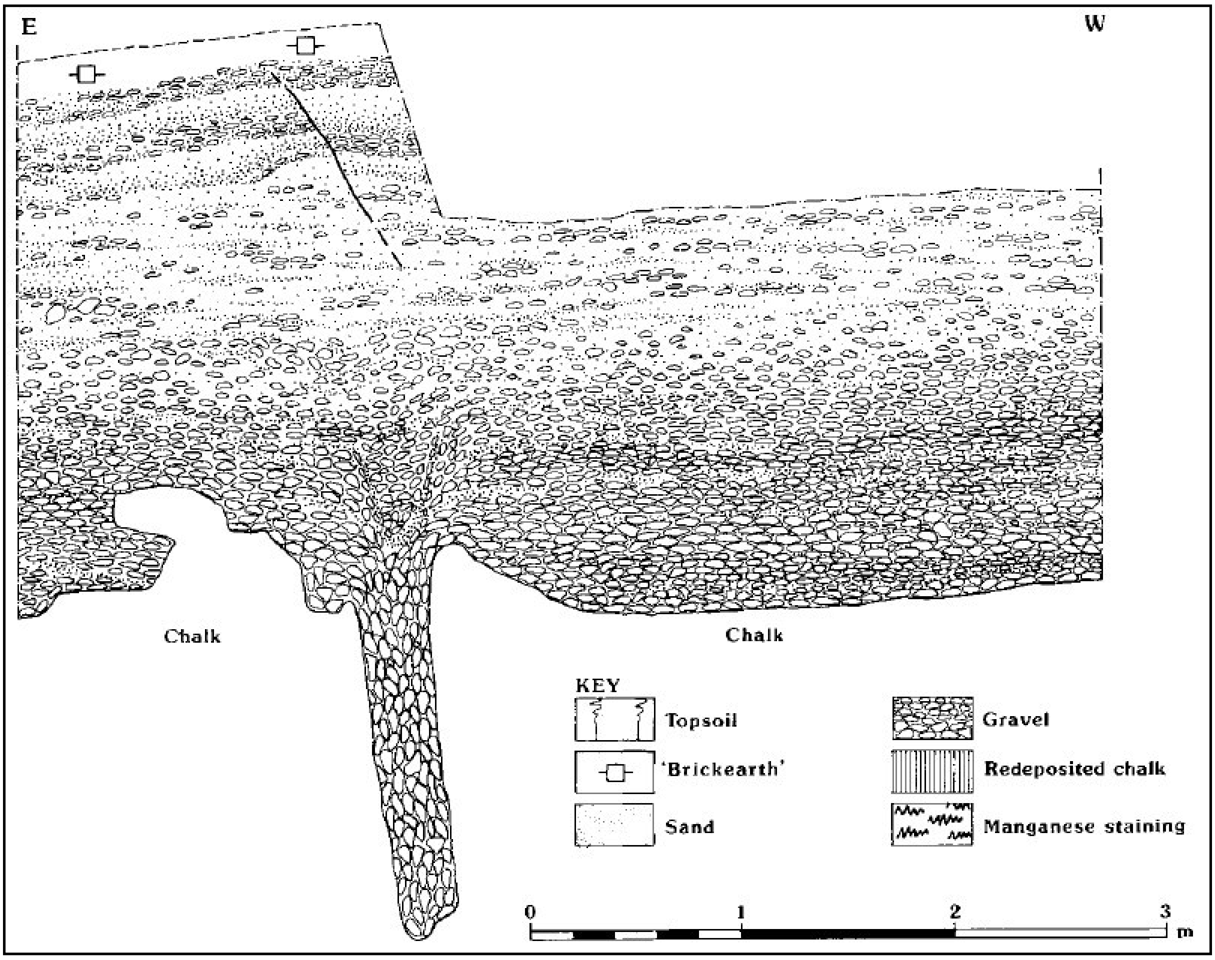


Figure 3.17 A section from Cooper's Pit, showing the deep solution features at the base of the deposits. From Harding et al., (1991).

Harding et al. (1991) described two divisions of the gravel across the Furze Platt pits, in a possible parallel to Ruscombe (see below). The lower of these divisions was 1.1m – 1.5m thick, and was a yellow, coarse, horizontally bedded and poorly sorted gravel which fined upwards. The upper division was 1.5 – 2.0m thick and was described as a medium-coarse sandy flint gravel with horizontal (and occasional cross) bedding.

Terrace stratigraphy.

Both Cooper's Pit and Cannoncourt Farm Pit are situated on the Lynch Hill terrace (Harding & Bridgland 1999), providing a broad age range of MIS 10 – 8.

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Furze Platt held in UK institutions. These are shown in table 3.13.

Table 3.13. Furze Platt Lower Palaeolithic archaeological inventory (Roe 1968b). Note that the ROM handaxes included in this study did not feature in Roe's Gazetteer.

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Furze Platt (general)	1693	300+	2
Cannoncourt Farm Pit	32	89	1
Maidenhead (general)	225	8	0
TOTAL	1950	397+	3

The historical importance and size of the Furze Platt handaxe assemblage has led to its inclusion in several large-scale studies of the British Lower Palaeolithic. Treacher (1896) considered Furze Platt to represent the ‘closest approach’ to a Palaeolithic ‘workshop’ in the Maidenhead area, due to the fresh condition of some of the handaxes, and the presence of numerous flakes (although it should be noted that Lacaille (1940) did not agree with the latter observation, noting that flakes were equally common at Lent Rise and Baker’s Farm Pit). Lacaille (1940) noted that the handaxe assemblage included large, finely made pointed types, large ficrons, and well-made cleavers. Later descriptions of the Cannoncourt Farm Pit handaxes (e.g., Wymer 1968; Roe 1968a; Cranshaw 1983) have also consistently noted that the Furze Platt assemblage was characterised by large, heavy pointed types with narrow (and often heavy and crude) ovates, ficrons and cleavers. Cannoncourt Farm Pit provided the largest single sample for Roe’s seminal morphometric study (Roe 1968a) and became one of Roe’s original Group I sites. The assemblage was considered to be ‘typical’ of Lynch Hill terrace handaxes (Roe 1981). Wymer’s typological analysis of Furze Platt handaxes is shown in figure 3.18.

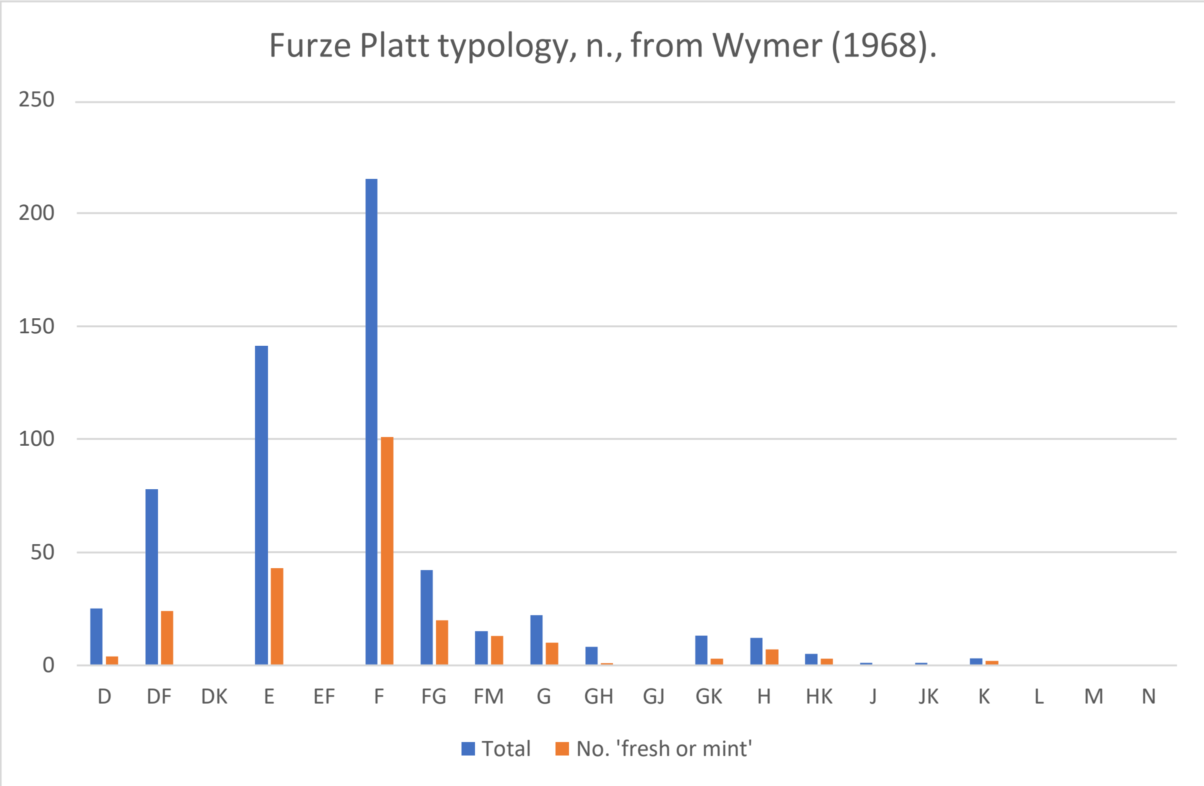


Figure 3.18. Wymer's (1968) typological analysis of handaxes from Furze Platt (Cannoncourt Farm Pit).

Cranshaw (1983) made an exhaustive study of Cannoncourt Farm Pit according to her own methodology based on a combined morphometric and technological analysis, with a particular emphasis on comparing the Furze Platt handaxe assemblage to Baker's Farm. She found the two assemblages to be 'substantially alike', with four key points of divergence:

1. The Baker's Farm handaxes were generally more abraded.
2. The Furze Platt handaxes were generally larger and heavier.
3. Baker's Farm had a notably higher number of cleavers (proportionally twice as many as occurred at Furze Platt).
4. Furze Platt had a higher number of ficrons (proportionally around half as many again as at Baker's Farm).

Cranshaw also noted several differences in composition between her 'worn' and 'less worn' series:

1. Furze Platt had four times the number of ovates, but only a quarter the number of ficrons in the most heavily rolled series compared to the less worn series.

2. Baker's Farm had more 'triangular types' and ficrons in the less worn series compared to the worn series.
3. Crude types (classified by Cranshaw as 'tongue on rough and pebble butt' types) were twice as common at both Baker's Farm and Furze Platt in the 'worn' series compared to the 'less worn series.

She provided additional observations regarding the cleavers and ficrons in her sample:

1. Almost half of the Furze Platt cleavers were classed as 'well made' (similar to Baker's Farm).
2. Tranchet removals occurred on only 40% of the Furze Platt cleavers, compared to over 60% at Baker's Farm.
3. Cleavers at Furze Platt were generally larger and heavier than other implement types.
4. Furze Platt featured a great range in size of ficrons, including both giant and diminutive 'toy' versions.
5. Furze Platt ficrons were generally less symmetrical than at Baker's Farm.

White (1998) identified Cannoncourt Farm Pit as an assemblage produced primarily using raw materials derived from river gravels, suggesting that human activity at the site ceased once the gravels were buried under sands. The exceptionally large 'Furze Platt Giant' handaxe found at Cannoncourt Farm Pit and held by the Natural History Museum, London, has factored into many discussions of the role of the handaxe in Lower Palaeolithic society (e.g. Wymer 1968; Kohn & Mithen 1999; Spikins 2012; White & Foulds 2018).

The Cooper's Pit handaxe assemblage has received far less attention, due in large part to the absence of Cooper's Pit handaxes in UK collections. A large collection of Furze Platt handaxes held in the ROM, Toronto, Canada were long speculated to represent the bulk of the errant Cooper's Pit handaxes (Fox n.d.; Cranshaw 1983; Harding et al. 1991b). The ROM collection comprised of objects sold to the museum by Ll. Treacher, and of objects donated to the museum by Z.A. Lash (who had previously purchased the items from Treacher himself). The only previous analysis of the ROM handaxes was in an unpublished undergraduate dissertation from 1976 (Fox n.d.). This analysis suggested that the ROM Furze Platt handaxes were equally split between ovate and pointed types, in marked contrast to Roe's (1968a) Cannoncourt Farm Pit sample. Cranshaw (1983) tentatively suggested that the ROM objects may relate to Cooper's Pit and were possibly derived from the higher (Boyn Hill) terrace based on both their morphological preferences and condition. Dale (2020a, 2020b) found that the ROM handaxes probably represented a mixture of both Cooper's Pit and

Cannoncourt Farm Pit objects, and that whilst there were indeed differences in both condition and shape preference, both samples showed an affinity for Roe's Group I (and were therefore both probably autochthonous to the Lynch Hill terrace, rather than derived). Dale suggested that lateral and vertical variation in artefact density could potentially explain the differences noted between the two pits, despite their proximity.

Sample.

532 handaxes were analysed in this study from the collections of the ROM (n=370) and BM (n=162). The BM (Lacaille) collection all originated from Cannoncourt Farm Pit. The ROM (Treacher) collection has a more complex and uncertain provenance. Dale (2020a) established that the ROM Furze Platt handaxes were collected in two broad phases; the earlier of these phases related to Cooper's Pit, and the later to Cannoncourt Farm Pit. This was supported by historical map regression using OS maps of the Furze Platt area, shown in figure 3.19, although a degree of uncertainty exists regarding a large group of handaxes which lack labels (in these cases, the date of accession was used instead).

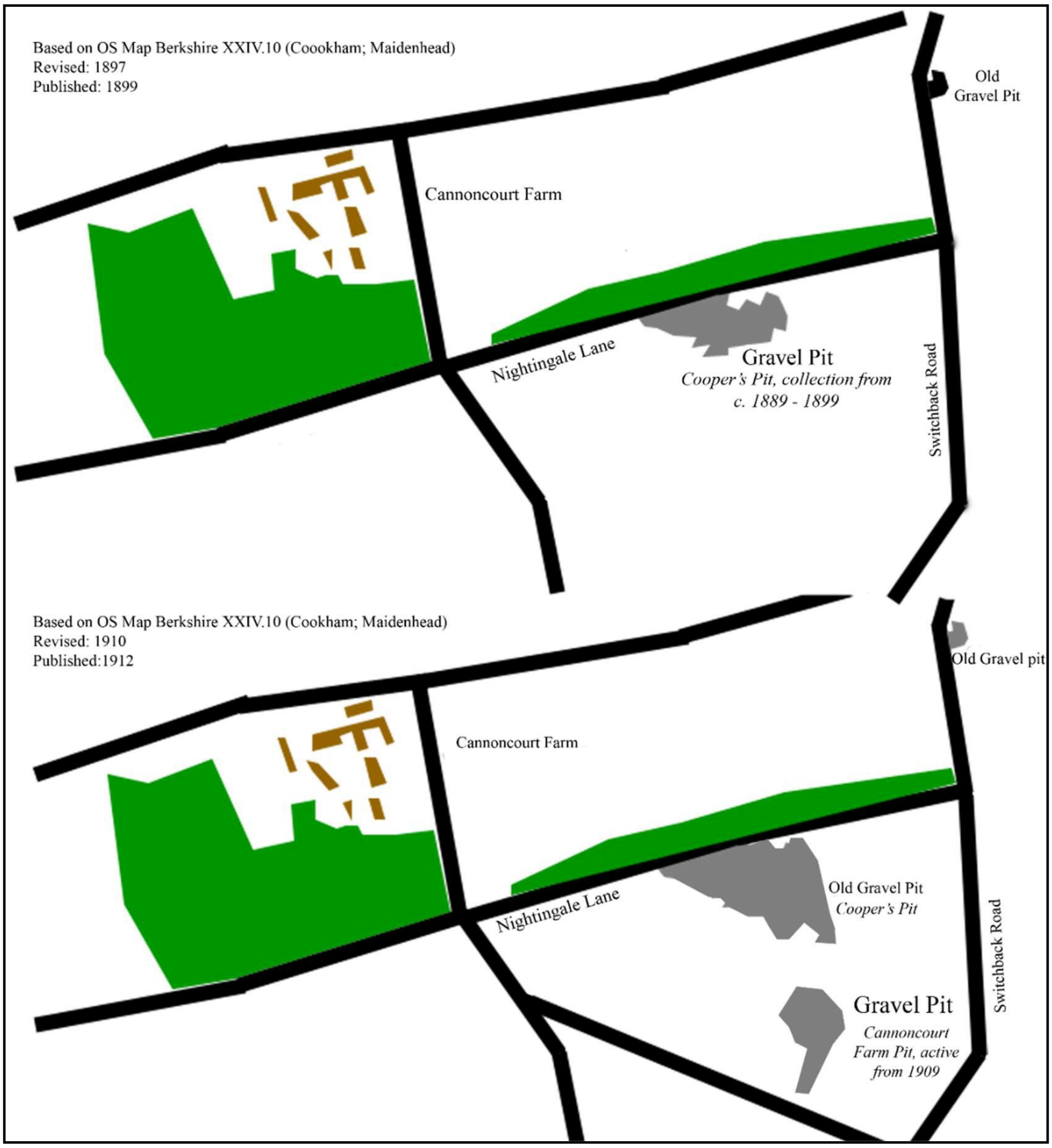


Figure 3.19. A historical map regression, based on OS maps, used by Dale (2020a) to provenance dated artefacts in the collections of the ROM.

3.3.4. IVER, Buckinghamshire. (TQ 024 802).

Site history.

Handaxes were first collected from the complex of pits in the area around the Grand Union Canal in Iver from the mid – late 19th Century (Brown 1895; Smith 1926). The archaeology originated from a small number of now-defunct commercial gravel pits (GWR Pit, Purser's Pit, Lavender Pit and Reeds Pit shown in figure 3.20, below), which showed a similar but laterally variable geological sequence. The sites were never formally excavated, but geological sections were recorded by J.A. Brown (1895) who inspected a gravel working at around 30.5m O.D. at an unspecified pit, and by Lacaille and Oakley (1936). Collection of palaeoliths was mostly made by the men working the gravel pits, which often presents problems in terms of provenance; however, Lacaille considered the men working the pits to be diligent and reliable in their collecting.

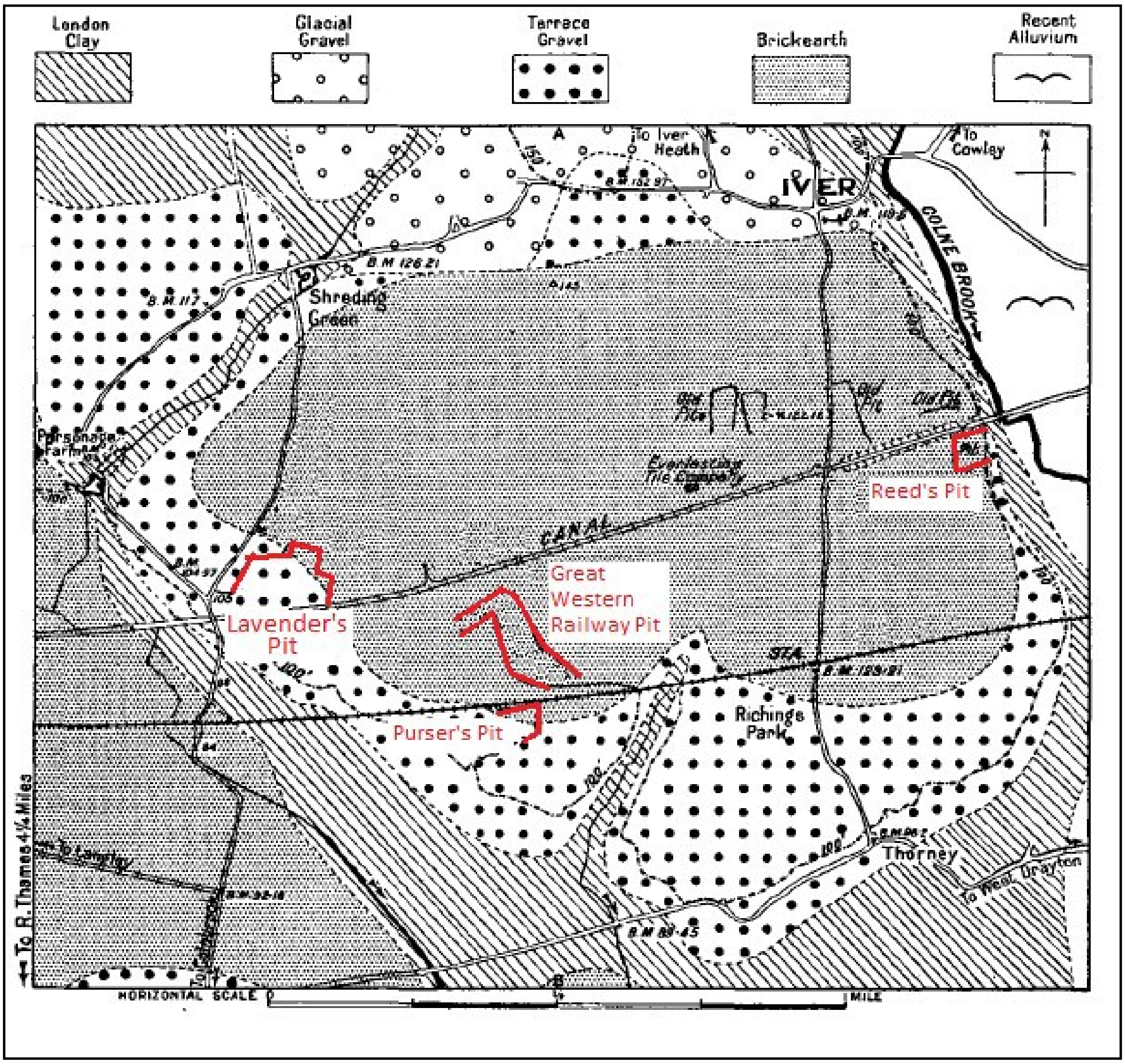


Figure 3.20. The various Iver pits shown on a simple geological map of the area, after Lacaille & Oakley (1936).

Geology and Stratigraphy.

The area spanned by the Iver pits was roughly 3.2km E-W and 1.6km N-S and consisted of at least four separate pits. A generalised sequence at Iver described by Lacaille (1936) featured a basal stratified but poorly sorted river gravel, fining upwards, over London Clay. These gravels, and the chalky solifluction gravels which overlaid them, were the source of the Iver handaxes. The gravels were capped by brickearths, which produced Levallois archaeology (Marsden 1927; Lacaille 1938).

Terrace chronology and stratigraphy.

The gravel pits at Iver exploited Lynch Hill terrace gravels (Wymer 1968).

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Iver held in UK institutions. These are shown in table 3.14.

Table 3.14. Iver Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Iver (general)	181	24	5
Iver (Lavender's Pit or Mansion Lane Pit)	58	78	10
Iver (G.W.R. Pit)	19	26	3
Iver (other)	29	17	3
TOTAL	287	145	21

Wymer (1968) suggested that handaxes with the general provenance 'Iver' probably originated from the GWR Pit, based on where early collectors tended to operate. Lacaille & Oakley (1936) described a handaxe assemblage containing 'Chelles (Abbeville); Clacton; Early-Late Middle St. Acheul; Early Levallois, all derived'. From this, and figured examples, it is possible to suggest a diversity of types including relatively crude and relatively well-made examples, including large ficrons and cleavers. Several distinctive asymmetrical examples were figured, reproduced below in figure 3.21.

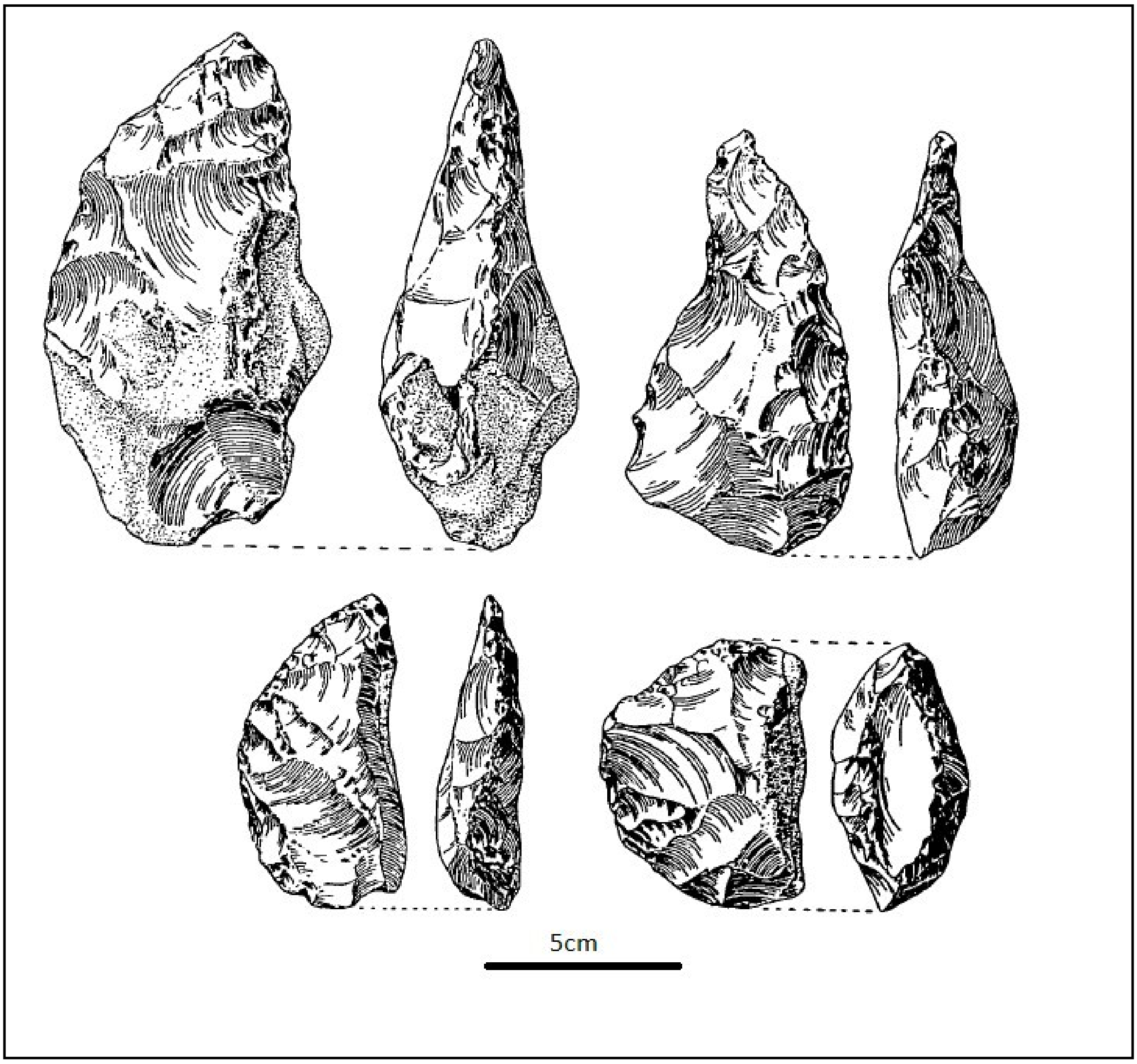


Figure 3.21. Asymmetrical handaxes from Lacaille & Oakley (1936).

Roe (1981) dismissed the handaxe assemblage, simply summarising that there were 'numerous handaxes of various kinds, all derived'. Wymer (1968) conducted an analysis of Iver handaxes from the Oxford University Treacher Collection and BM Sturge and Rutland Collections, shown in figure 3.22 below. He noted a clear preference for pointed types over ovate and cordate types with a large proportion of 'crude' types. Despite this, Wymer remarked on the greater representation of ovate forms compared to the nearby Lynch Hill site at Burnham (Wymer (1968), c.f. Lent Rise, this study). Both Lacaille and Wymer noted that the condition of the Iver handaxes was very poor, with the former stating that 'it would be difficult to find palaeoliths more injured by natural agencies than a collection from the Iver gravels' (Lacaille & Oakley 1936).

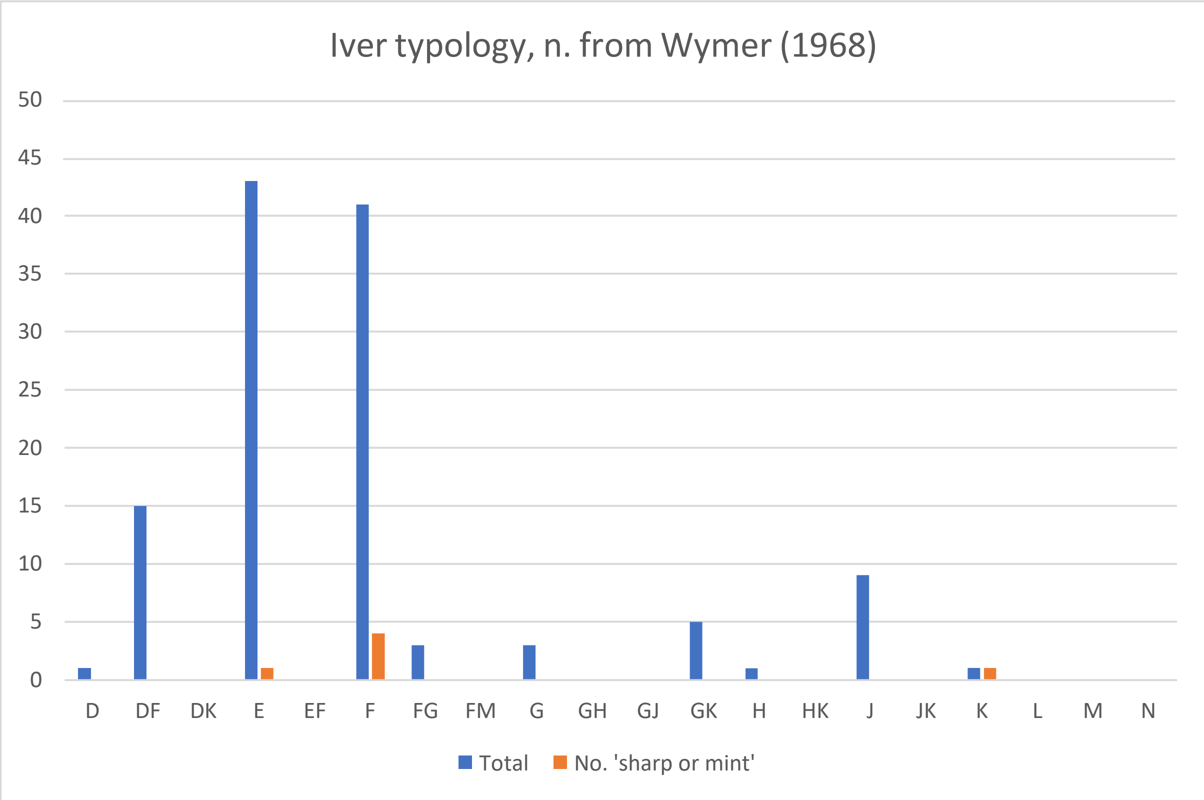


Figure 3.22. Wymer's (1968) typological analysis of handaxes from Iver.

Sample.

139 handaxes were analysed in this study, primarily from the BM Lacaille collection, although at least 24 of the objects appear to pre-date Lacaille's collecting activities in the area and presumably relate to Brown's collecting. Annotated and labelled handaxes provided the following outline of the specific pits from which artefacts were obtained (table 3.15.).

Table 3.15. Provenances, where given, for the Iver handaxes.

Pit name	Number	Date range given.
Lavender's Pit (annotated M.L., 'Mansion Lane')	70	1931 - 1936
G.W.R. Pit	12	One object dated 1894
Mead's Pit	4	1896
Purser's Pit	5	1924 - 1932
Studd's Pit	12	1890 – 1893.

3.3.5. LENT RISE. (SU 927 818).

Site history.

The site at Lent Rise, Burnham initially consisted of three gravel pits (Haycock's Pit, Almond's Pit and Stomp Road Pit) which eventually merged (Wymer 1968; Wymer 1999). The earliest references to Palaeoliths from Lent Rise dates to 1925 (Anon 1925, in Wymer 1968). Lacaille (1940) noted that the pits he observed were merely extensions of 'long abandoned' workings in the area.

Geology and Stratigraphy.

The stratigraphy at Lent Rise, based on Lacaille's (1940) observations from Almond's Pit and Stomp Road Pit, featured an undulating chalk bench bedrock, overlaid by fluvial gravels and capped by brickearth. The gravel at Lent Rise was stratified although lacking in 'even bedding', poorly sorted and cryoturbated slightly towards the top, with larger flint nodules concentrated towards the base. The stratification was destroyed in places by solifluction (Lacaille 1940, Wymer 1968). The sequence was 2.4m – 4.8m thick. Lacaille drew particular attention to the disruption of bedding through solifluction, a feature which had earlier featured in the Abbe Breuil's seminal work on solifluction deposits (Breuil 1934).

Terrace stratigraphy.

Lent Rise is situated on the southern margin of the Lynch Hill Terrace (Wymer 1968).

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Lent Rise held in UK institutions. These are shown in table 3.16.

*Table 3.16. Lent Rise Lower Palaeolithic archaeological inventory (Roe 1968b). *Roe (1968b) suggests that 'many' of the general – provenance handaxes must have originated from Almond's Pit.*

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Lent Rise (general)	124	122	3
Lent Rise (Almond's Pit)	19*	0*	0*
TOTAL	143	122	3

Lacaille (1940) made detailed observations on the Lent Rise handaxes, noting:

- A small component of derived, heavy and boldly worked handaxes.
- An unusually large number of ‘exceptionally large and massive tools’.
- The presence of crudely worked, large ‘side choppers’ along with cleavers.
- The presence of finely worked ficrons of varying sizes, often with unworked butts.
- The generally high proportion of residual cortex, and the widespread use of hard-hammer finishing.

There is certainly some suggestion of the same lateral variation in artefact type and density seen at other Middle Thames Lynch Hill sites (e.g., Furze Platt), as Lacaille (1940) mentions that the very small pit in the kitchen garden of Mr W.F. Haycock produced an ‘extraordinarily fine series’ of handaxes. These must have been densely concentrated, given the ‘insignificant’ size of the pit and the infrequency of its working. Most of the artefacts (handaxes, cores and flakes) figured in Lacaille (1940) are provenanced to the lowermost 0.13m of gravel, or else were found in spoil, with little indication of stratigraphic segregation according to type or condition. One of these was found 0.11m *from the surface*, i.e. higher in the gravel than the bulk of the assemblage. This artefact, a large cleaver with *tranchet* removals from both faces, was later figured in Wymer (1968).

Roe (1981) noted the similarity of the Lent Rise handaxes to Furze Platt and Baker’s Farm although the artefacts from the former site were ‘somewhat more disturbed’ than the others. He considered Lent Rise to be attributable to his Group I (Roe 1981). Wymer (1968) analysed 223 Lent Rise handaxes from the Treacher and Head collections at the Oxford University Museum and Buckinghamshire County Museum, Aylesbury respectively (shown in figure 3.23). Wymer’s results point to a low typological diversity at Lent Rise when compared to other sites of supposedly similar age, with an overwhelmingly large proportion of pointed types. Ficrons and cleavers were both present, although only weakly biconcave ficrons or demificrons (type FM) were reported.

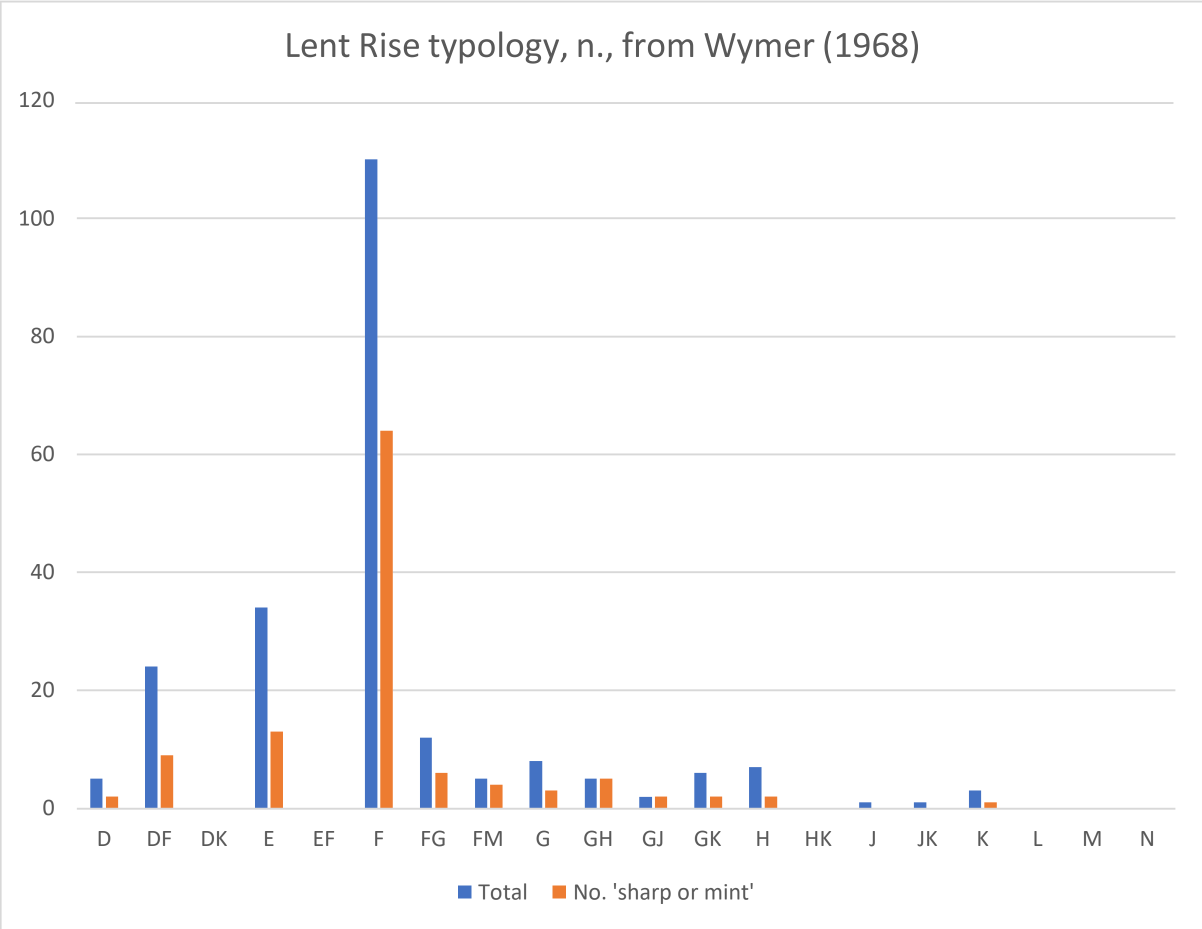


Figure 3.23. Wymer's (1968) typological analysis of handaxes from Lent Rise.

Sample.

126 handaxes were analysed in this study, all from the BM A.D. Lacaille collection. 17 were found to be broken and consequently removed from the morphometric analysis. This sample includes a significant number of handaxes from a different collection to those drawn upon by Wymer (1968), and as such may provide an interesting addition to his data.

3.3.6. RUSCOMBE, Berkshire. (Brickyard, SU 795 762).

Site History.

The majority of the provenanced Palaeolithic material from Ruscombe is attributed to Ruscombe Brickyard (also called Cotterell's Pit, SU 795 762) and Northbury Farm Pit (SU 792 767), in addition to a significant number of Ruscombe handaxes with no specific provenance. Those with a 'general' provenance probably originated from to the Brickyard, which was noted as being particularly prolific

(Treacher et al. 1948). The pits were operational in the later part of the 19th century (Shrubsole 1890; Treacher 1896) but worked more intensively in the first half of the 20th century (Wymer 1968). They were filled-in by the time Wymer visited them in the 1960s (Wymer 1968).

Geology and Stratigraphy.

Shrubsole (1890) observed that between 0.61 - 0.91m of fluvial gravel had been removed by the workmen to gain access to the underlying Reading Clay. The gravel contained a possible primary-context Acheulean assemblage at the interface with the Reading Clay (Treacher 1896). White & Treacher (1901) identified two different gravels based on their differing clast composition but observed that they were mixed except for at the north side of the pit. The gravels were described as consisting of sub-angular and 'pebbly' flints along with Bunter quartzite and Greensand chert, well stratified and sandy in places but disturbed by oblique 'piping' into the underlying Reading Clay in other places at the western end of the pit (White & Treacher 1901; Sealy & Sealy 1956; Wymer 1968).

Terrace stratigraphy.

Ruscombe is situated on the Lynch Hill terrace (Treacher et al., 1948; Wymer 1968).

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Ruscombe held in UK institutions. These are shown in table 3.17.

Table 3.17. Ruscombe Lower Palaeolithic archaeological inventory (Roe 1968b). Note that the ROM handaxes included in this study did not feature in Roe's Gazetteer.

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Ruscombe (General)	82	29	0
Ruscombe (Northbury Farm)	27	6	6
Ruscombe (Prior's Pit)	63	29	3
Ruscombe (Other)	7	0	1
TOTAL	179	64	10

Roe (1981) noted that the handaxes appeared to be 'classic' examples of his Group I. Treacher (1896) provided a brief but illuminating report of the context in which the Ruscombe handaxes were found. He observed large flint clasts at the base of the gravel, which he interpreted as having been deposited by ice, and which he considered the probable raw material source for the handaxes. He wrote that most of the handaxes were found separately at the base of the gravel, some of which were resting on or slightly pressed into the underlying clay. He mentions two places in which sharp, unabraded handaxes occurred in clusters of four or five along with debitage, suggesting *in situ* evidence of manufacturing (c.f. Cooper's Pit, Furze Platt, which he also described as 'approaching' a Palaeolithic workshop). He contrasted this with the generally abraded character of implements found within the overlying fluvial gravels. Presumably because of these distinctions, Wymer (1968) elected to analyse the sharp and rolled artefacts separately, but he identified no obvious typological distinction between the two. Wymer's analysis (figure 3.24, below) pointed to an assemblage very similar to Lent Rise, dominated by pointed types with smaller numbers of crude types and sub-cordate types. He identified a small number of cleavers, but no ficrons.

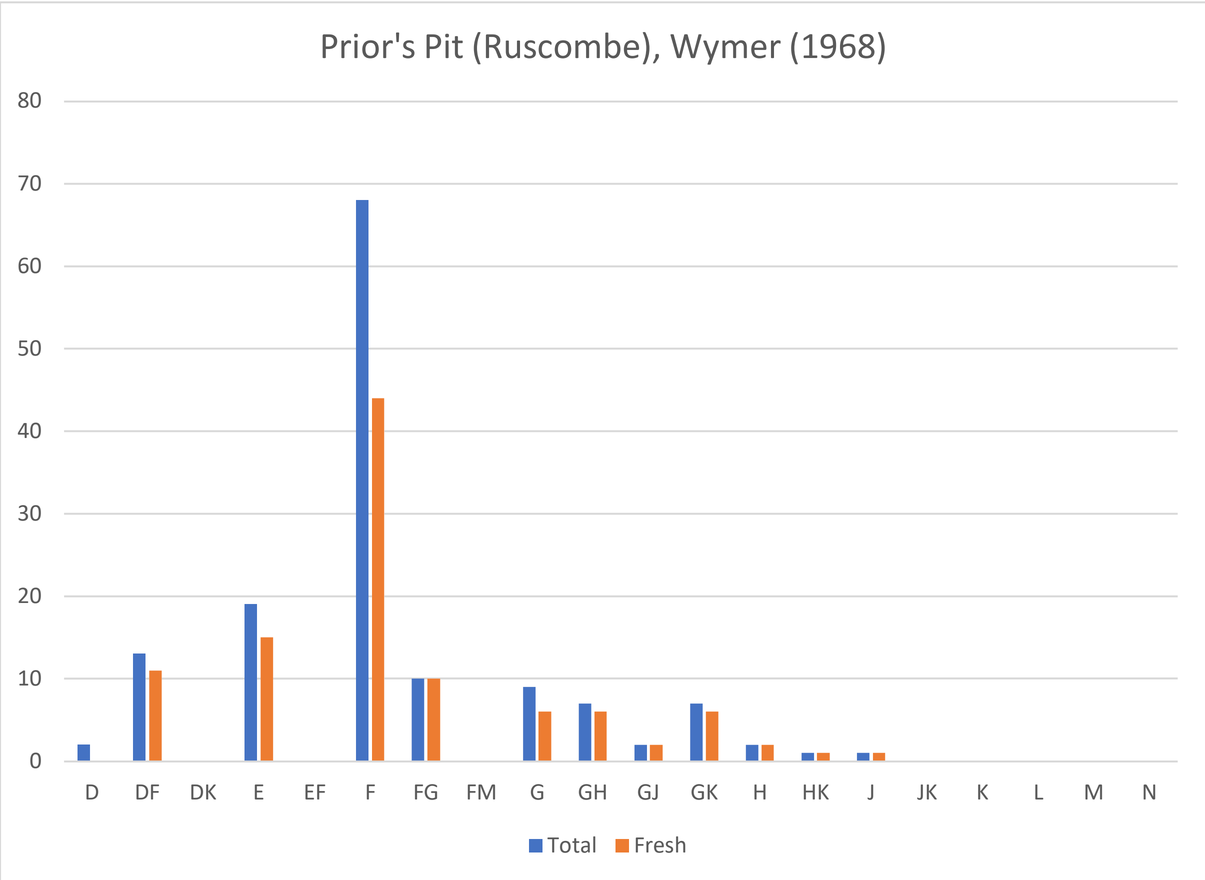


Figure 3.24. Wymer's (1968) typological analysis of handaxes from Prior's Pit, Ruscombe.

Sample.

111 handaxes were analysed in this study, all from the Ll. Treacher collection at the ROM. The

studied sample includes handaxes from Ruscombe, Northbury Farm (n=13), fields around Northbury Farm (n=2) and Ruscombe, general provenance (n=96). 3 handaxe fragments were also recorded buy were not suitable for morphometric analysis.

3.4. The Upper Thames.

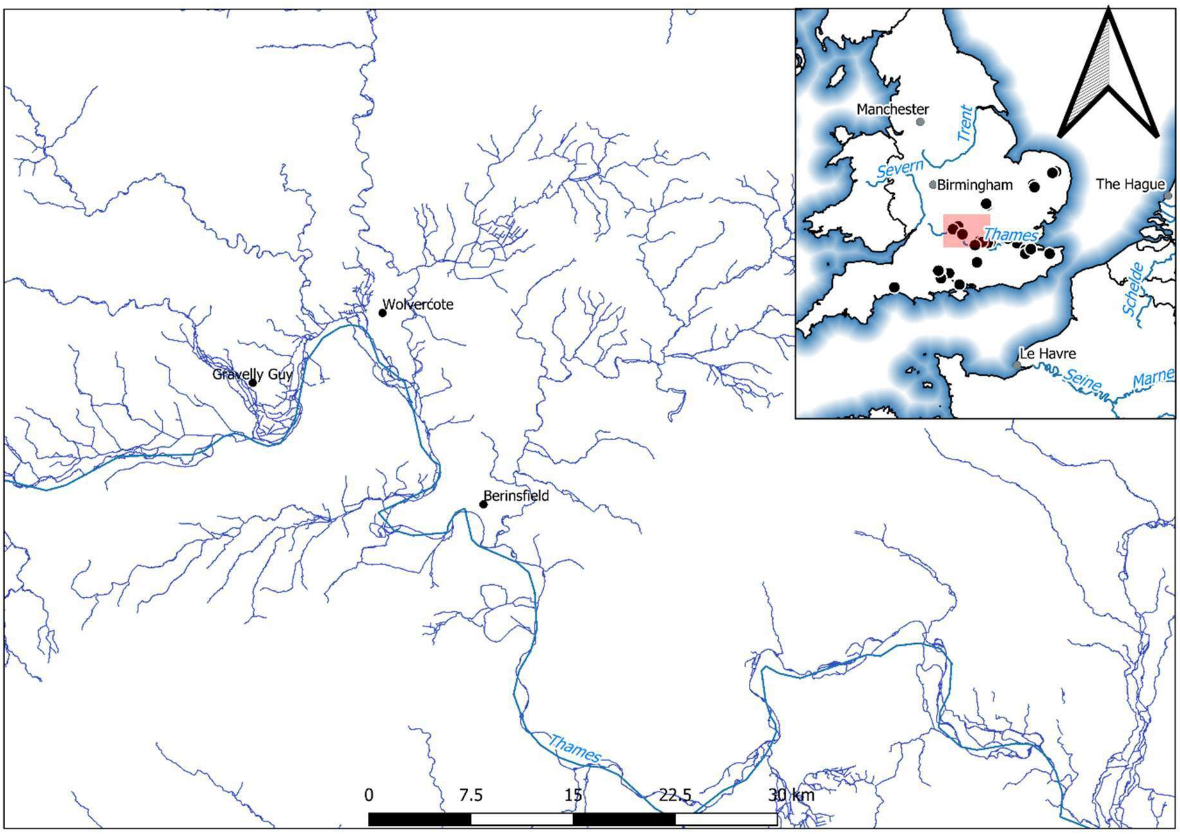


Figure 3.25. Upper Thames map.

3.4.1. WOLVERCOTE, Oxfordshire (SP 498 105).

Site history.

The Wolvercote archaeological site was discovered in the late 19th century in a working brick pit, which exposed Pleistocene channel deposits. The archaeological assemblage was described by Bell (1894, 1904), Sandford (1924), Roe (1968) and Wymer (1968), although Tyldesley (1986) has provided the most thorough analysis of the extant material to date. The last direct observations of the geology appear to have been by Sandford between 1921 and 1923, and significant exposures have not been available for study since the 1930s (Schreve 1997). A temporary exposure was opened on the eastern edge of the pit during the 1980s (Briggs et al., 1985; Tyldesley 1986). Attempts to relocate the channel sediments since then have been unsuccessful (e.g., Bridgland &

Harding 1986) and the original pit is now inundated and surrounded by residential developments.

Geology and Stratigraphy.

The sequence at Wolvercote was described and illustrated in detail by Bell (1894, 1904) and Sandford (1924), which have been the basis for much of the subsequent interpretation of the geology at Wolvercote (e.g., by Tyldesley 1986; Bridgland 1994). Bridgland's (1994) summary of the sequence is shown in table 3.18.

Table 3.18. Summary of the stratigraphy at Wolvercote, after Bridgland (1994) who based his interpretations on primary descriptions by Sandford (1924).

Stratigraphy	Notes.
Bed 6. Gravelly, clayey sand ('warp' sand), 1-2m thick.	Deformed by cryoturbation.
Bed 5. Silts and clays. Laminated.	Pollen bearing.
Bed 4. Peat	Localised occurrence in the base of bed 5. Plant macrofossils, mosses, pollen and beetles recovered from this bed (Duigan, 1956).
Upper Iron Pan.	
Bed 3. Sandy gravel. Current/ cross-bedded ferruginous gravel.	Seventeen mollusc species recorded (Kennet and Woodward, 1924).
Lower Iron Pan	
Bed 2. (Basal) Calcareous gravel.	Sandford (1924) recorded many large vertebrate bones in swirl-holes at the base of this bed (described below).
Bed 1. Wolvercote Gravel. Bedded, truncated by the overlying channel deposits.	Attributed to the Wolvercote terrace by Sandford (1924), supported by Bridgland (1994). Bishop (1958) conjectured an older origin.
(Surface of the Oxford Clay, at variable height)	

Terrace stratigraphy.

The stratigraphic position of the Wolvercote Channel Deposits relative to the Wolvercote Terrace Gravel has been the subject of some debate, summarised fully in Bridgland (1994). He correlated the Wolvercote Channel Deposits and the Wolvercote Gravel with the Middle Thames Lynch Hill terrace, although direct correlation is hampered by the lack of terrace features in the Goring Gap, a constricted valley reach which separates the Upper and Middle basins of the Thames. Bridgland

(1994) interpreted the Wolvercote Gravel as representing the Phase 2 (pre-interglacial) aggradation, meaning the incised Wolvercote Channel Deposits must post-date this phase. This is consistent with the biostratigraphic evidence outlined below.

Biostratigraphy, climate and environmental reconstruction.

The faunal assemblage of the Wolvercote deposits is undiagnostic of age (Bridgland 1994; Bridgland & Schreve 2009) but offers evidence for environmental reconstruction. Temperate conditions were indicated in the Wolvercote Channel Deposits by the presence of *Palaeoloxodon antiquus* and *Bos primigenius*, but more open grassland indicative of cooler climate was reflected in the presence of *Equus ferus* and *Stephanorhinus hemitoechus*. Deteriorating climatic conditions were evidenced by the plant macrofossil and coleopteran remains from beds 4 and 5 (Briggs et al. 1985) but Duigan (1956) noted that most of the 16 plant macrofossils identified can still be identified in present-day Oxfordshire, suggesting similar temperatures to the present south of England. The combined floral and faunal evidence also points to a temperate-to-cooling climate, perhaps to the cooling limb of MIS 9-8 (i.e., following MIS 9a) or to the cooling limb of one of the three sub-stage interstadials within MIS 9, perhaps MIS 9e – 9d (Schreve 2001; Bridgland & Schreve 2009; White and Bridgland 2018).

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Wolvercote held in UK institutions. These are shown in table 3.19.

Table 3.19. Wolvercote Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Wolvercote (Wolvercote Ancient Channel)	75	110	0
Wolvercote (other)	8	0	0
TOTAL	83	110	0

The Wolvercote handaxes mostly derive from beds 1 and 2. There is no evidence of human occupation above the upper iron pan, after which the climate may have significantly deteriorated. The handaxes are made predominantly on flint but with a significant component of quartzite and greywacke (Wymer, 1968; Roe, 1981; Tyldesley, 1988). Tyldesley (1986) judged the handaxes to be in generally good condition, with 86% of the material in ‘fresh’ or ‘mint’ condition. She noted that the handaxes were mostly pointed with a handful of 'slipper shaped' plano-convex examples (n=8), the latter of which have been widely discussed.

Roe (1968a) assigned Wolvercote to its own sub-group (group III) as a sub-set of his pointed tradition. He compared the Wolvercote handaxes to the European Micoquian tradition, which he used to suggest an MIS 7 / MIS 5e age (Roe, 1994). Wymer (1968) compared the handaxes, the bulk of which were relatively unremarkable pointed types, to Swanscombe (i.e., MIS 11 – MIS 10). The results of Wymer's typological analysis are shown in figure 3.26.

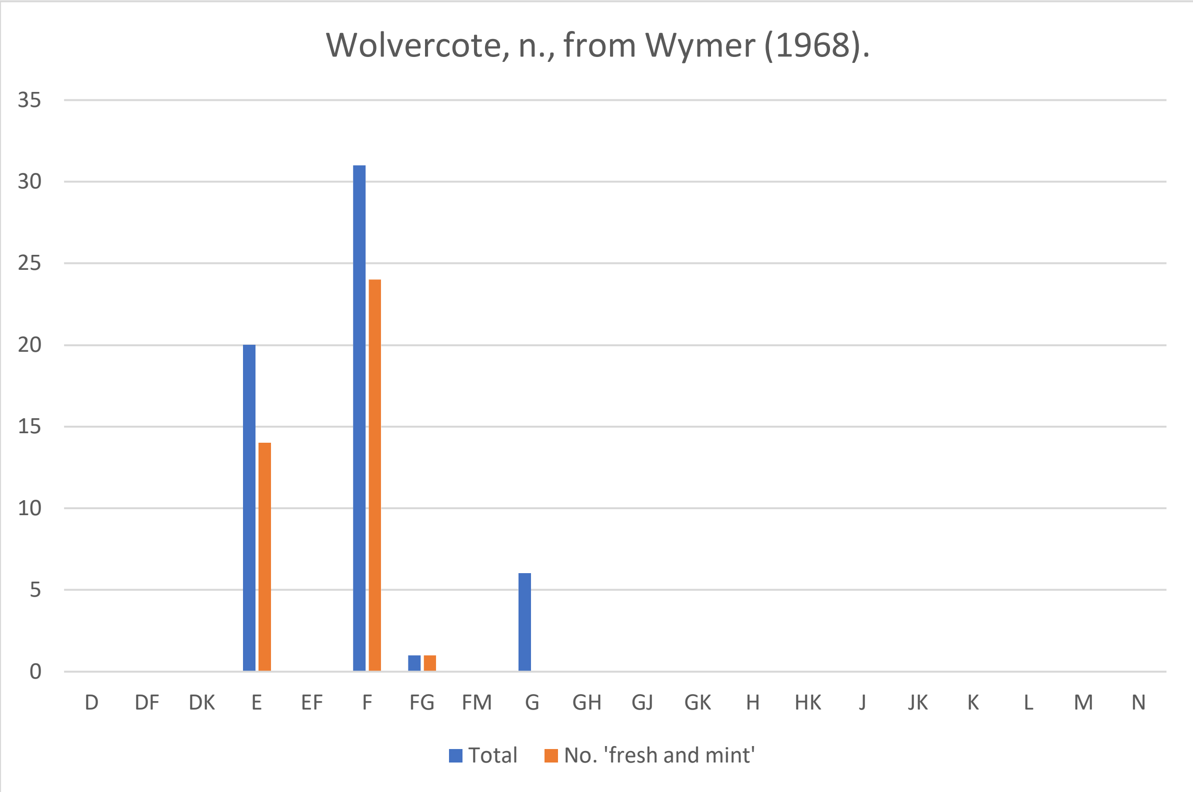


Figure 3.26. Wymer's (1968) typological analysis of handaxes from Wolvercote.

Tyldesley suggested that a manufacturing site was represented, perhaps the work of a single knapper in a single day, although this interpretation seems somewhat at odds with the relatively large number of Wolvercote handaxes (although this in turn may be balanced against the smaller proportion of the assemblage which is plano-convex). The flint nodules in the Wolvercote gravels were too small and structurally weak to provide the raw materials for the large, high quality handaxes found at the site (e.g., Briggs et al. 1985; Tyldesley 1986; Maddy et al. 1991). Several alternative source regions for the Wolvercote handaxe raw material have been suggested, including the relatively distant gravels of the Middle Thames (Ashton 2001) and the Wallingford Fan Gravels (MacRae 1988), despite Lower Palaeolithic material transfers occurring overwhelmingly over short

(>5km) distances (Feblot-Augustins, 1993). White (1998) suggested an unidentified source derived from local gravels, which would be more consistent with Lower Palaeolithic raw material procurement strategies but lacks archaeological or geological evidence at present. White (1998) integrated the shape of the Wolvercote plano-convex handaxes into his raw material hypothesis, noting that the flat character of the flakes and plaquettes which had been used as blanks (used due to the paucity of local good quality flint) promoted the production of plano-convex morphologies. Ashton (2008) suggested that larger handaxes appeared to have been preferentially transported (allowing for prolonged reduction and resharpening), and that the distinctive plano-convexity could represent a consideration of weight reduction for transport (Ashton, 2001; 2008). Ashton also produced a model which attempted to explain the plano-convexity of the Wolvercote handaxes in terms of progressive resharpening, a point returned to in the discussion chapter.

Sample.

41 handaxes were analysed in this study from the collections of the PRM A.M. Bell collection.

3.4.2. STANTON HARCOURT (Gravelly Guy Pit), Oxfordshire (SP 402 055).

Site history.

Handaxes from Stanton Harcourt mostly originated from the Gravelly Guy Pit (SP 402 055) (Lee 2001). Archaeological observations at Stanton Harcourt were undertaken my R.J. MacRae between 1984 and 1989 (MacRae 1988, 1989, 1991; Bridgland 1994).

Geology and stratigraphy.

Descriptions of the geology at Gravelly Guy Pit are lacking, presumably because of the mechanical excavation of the pit and its rapid in-filling with refuse after the pit had closed (MacRae 1990), however the local Stanton Harcourt Gravel and Stanton Harcourt Channel deposits have been thoroughly described through excavations at the nearby Dix Pit between 1990 and 1999 (Scott & Buckingham 2001, 2021). The deposits at Dix Pit were formed of two broad divisions; an upper unit of limestone sands and gravels (5-6m thick) overlaid the fossiliferous, finer grained Stanton Harcourt Channel deposits (1m thick). MacRae (1990) described the gravel lithology at Gravelly Guy Pit as being flint-poor and composed mostly of small Jurassic Limestone pebbles along with Bunter quartzite pebbles and cobbles (on which some of the handaxes were made).

Terrace stratigraphy.

Stanton Harcourt is situated on the Summertown-Radley Terrace of the Upper Thames. The terrace staircase in the Upper Thames cannot be readily correlated with analogues in the Middle and Lower

Thames, a fact which makes dating more complex. This problem is exacerbated in the Summertown-Radley Terrace, as the formation shows evidence of having aggraded over two full glacial cycles, with three cold and two warm stage deposits represented. A suggested stratigraphy of the formation is outlined in table 3.20 (from Bridgland 1994).

Table 3.20. A generalised terrace stratigraphy for the Upper Thames, after Bridgland (1994).

Formation	Member	Climate	Terrace model phase	MIS correlation
Summertown-Radley	Unnamed upper gravel at Eynsham	Cold	4	MIS 5d – 2(?)
	Eynsham Gravel	Temperate	3	MIS 5e
	Stanton Harcourt Gravel	Cold	2 and 4	MIS 6
	Stanton Harcourt Channel Deposits	Temperate	3	MIS 7
	Unnamed lower gravel at Summertown, with *Corbicula*.	Cold	2	MIS 8

The Stanton Harcourt Channel deposits were found to be fossiliferous, containing a faunal and floral assemblage which was biostratigraphically correlated with MIS 7 (Bridgland 1994), an age attribution supported by AAR ratios (Bowen et al. 1989; Bowen 1999). The overlying Stanton Harcourt Gravel was correlated with MIS 7 – 6, representative of Phase 5 of Bridgland's model. The ameliorating (MIS 8 – 7) Phase 2 gravel is less well represented, represented by a *Corbicula* rich unnamed gravel at Summertown.

Archaeology review.

MacRae (1988) reported that handaxe finds diminished greatly after 1987, as did the incidence of mammoth teeth and tusks which had been abundant between 1984 and 1987. MacRae noted that these changes occurred as the working face of the pit migrated away from the Stanton Harcourt Channel deposits, suggesting that both archaeology and palaeontology were in some way associated with the channel itself (R.J. MacRae *pers. comm*. in Bridgland 1994). Bridgland (1994) suggested that the Stanton Harcourt Channel deposits had originally accumulated to a considerable thickness but were subsequently eroded away. Artefacts contained within the temperate deposits were then reworked into the Stanton Harcourt Gravel. This would imply that the Stanton Harcourt archaeological assemblage *at least* pre-dated the formation of the Stanton Harcourt Channel in MIS 7.

Interestingly, MacRae (1988) suggested that some of the broken handaxes found at Stanton Harcourt had been resharpened into usable implements, in a rare example of 'recycling' (c.f. Brumm et al. 2019). Hardaker (2001) suggested that the raw material source for the Stanton Harcourt handaxes was some 18km away, with MacRae (1988) suggesting even more distal sources (24km cross-country or 54km if following the course of the Thames). These are unusually long-distance material transport distances for the Lower and Middle Palaeolithic, but perhaps more typical of the flint-poor Upper Thames than other regions (MacRae 1988; Feblot-Augustins 1993). MacRae (1990) provided a brief typological summary of Gravelly Guy pit, using Wymer's scheme: this is shown below in figure 3.27.

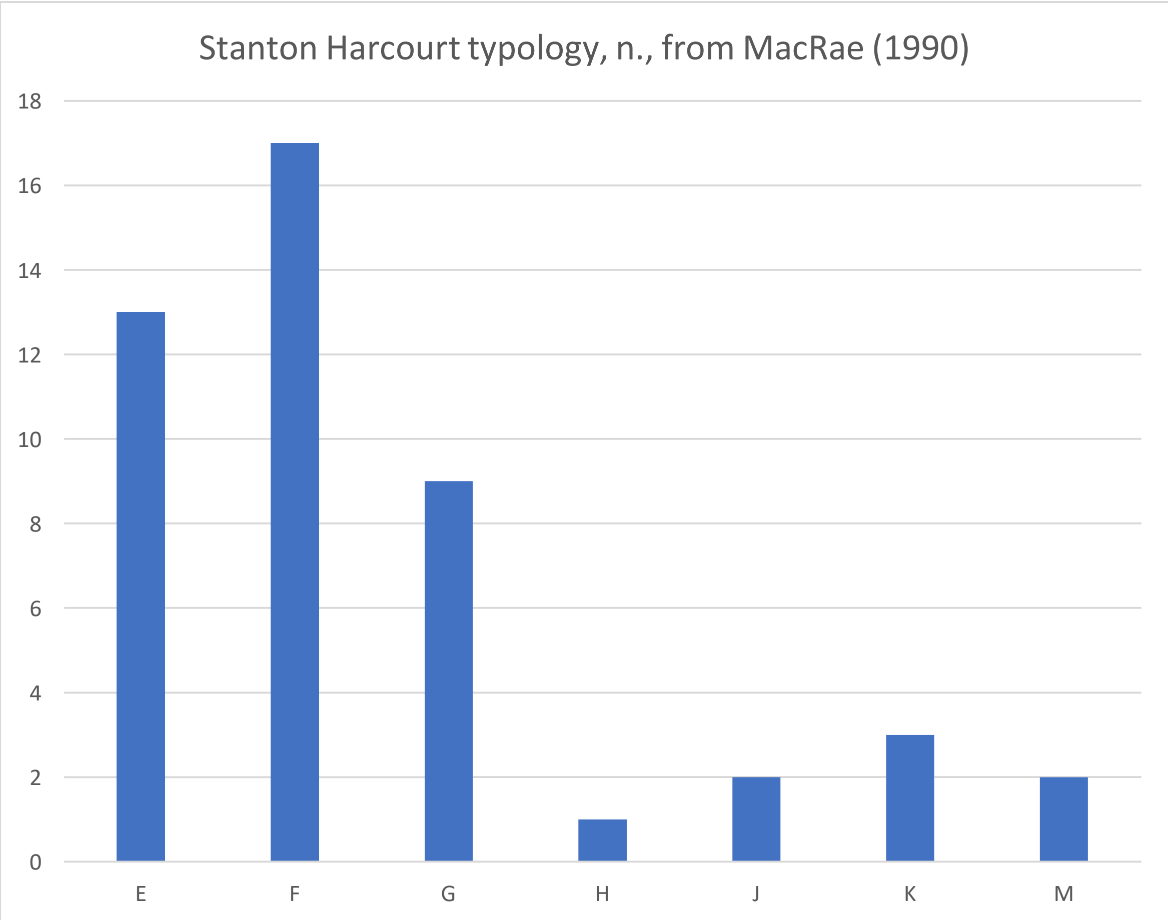


Figure 3.27. Stanton Harcourt handaxe typology, from MacRae (1990).

Lee (2001) provided a thorough morphometric, typological and taphonomic assessment of the Stanton Harcourt handaxes, the results of which are presented and analysed in the following chapters. Lee assessed 56 complete handaxes from Stanton Harcourt, including examples from the Stanton Harcourt Channel, Stanton Harcourt Gravel, and Gravelly Guy Pit. The handaxes were collected by R.J. MacRae in the 1980s.

3.4.3. BERINSFIELD, Oxfordshire (Queenford Farm Pit: SU 585 592).

Site history.

Around 205 flint and quartzite artefacts were collected from two gravel pits (Queenford Farm Pit and Mount Farm Pit) near Berinsfield by R.J. MacRae between 1974 and 1982 (MacRae 1982; Tyldesley 1986).

Geology and stratigraphy.

No detailed geological description of the site was published (MacRae 1982; Emery 2010), although MacRae (1982) suggested that much of the terrace gravel of the Upper Thames was emplaced by braided river channels.

Terrace stratigraphy.

Briggs (in MacRae 1982) suggested that the Berinsfield gravels may correlate with the Linch Hill Channel, predating the Summertown-Radley terrace. Lee (2001) suggested that the Berinsfield pits might occur towards the base of the Summertown-Radley terrace. The bedrock geology was Cretaceous sands and clays rather than clay, in contrast to nearby Stanton Harcourt (Scott & Buckingham 2001).

Archaeology review.

MacRae (1982) noted that the artefacts seemed to occur in the lower levels of the gravel and even beneath the gravel deposits, which MacRae (1982) and Tyldesley (1986) interpreted as showing that the artefacts pre-dated, and were incorporated into, the gravel. However, as many of the finds were made on reject heaps and conveyors, little reliable stratigraphic information is available (MacRae 1982). The small handaxe assemblage from Berinsfield, Oxfordshire, is considered here due to its tentative Group I attribution by previous researchers (Roe 1981, Emery 2010), and the occurrence of six Levallois flakes (Wymer 1968; Lee 2001), which together may be interpreted as suggesting MIS 9 age. However, this interpretation must be treated with caution, given the lack of non-archaeological dating evidence available for the site. Tyldesley (1987) suggested that the artefact assemblage may be mixed, although this does not preclude multiple phases of occupation within a single interglacial phase. Lee (2001) suggested broad contemporaneity with Stanton Harcourt, although this was primarily based on the similarity of the lithic assemblage and the fact that the Berinsfield finds 'probably' also occurred at the base of the Summertown-Radley Terrace. As with Stanton Harcourt, Lee (2001) provided full morphometric data for a small collection of 37 unbroken flint and quartzite handaxes from Berinsfield.

3.5. The Wey (terraces of the Palaeo-Blackwater).

3.5.1. FARNHAM (TERRACE C), Surrey (Upper Snailslynch Pit: SU 827 451).

Site history.

Various gravel pits on Farnham terrace C were worked in the early twentieth century. Major collections were made by Maj. A.G. Wade and H. Bury (Bury 1919; Wade & Smith 1934).

Geology and stratigraphy.

Wade & Smith (1934) provided a brief geological description of Elsmore's Pit, one of the named archaeologically productive pits on Farnham terrace C. They observed 'stratified sand, clay and firm gravel' over an underlying geology of Lower Greensand and capped with a clay containing a well-made side-scraper. This is consistent with Bury's even briefer description of Snailslynch Pit (Bury 1919).

Terrace stratigraphy.

The Farnham terrace staircase relates to the Palaeo-Blackwater, rather than the present river Wey (Bridgland & White 2018). Bridgland & White (2018) noted that the Farnham terrace staircase showcased the supposedly chronologically significant patterning in handaxe morphology (and the first occurrence of Levallois technology) which they had previously identified in the Thames terraces (Bridgland & White 2014, 2015). Their interpretation of the Farnham terrace staircase is shown below in figure 3.28

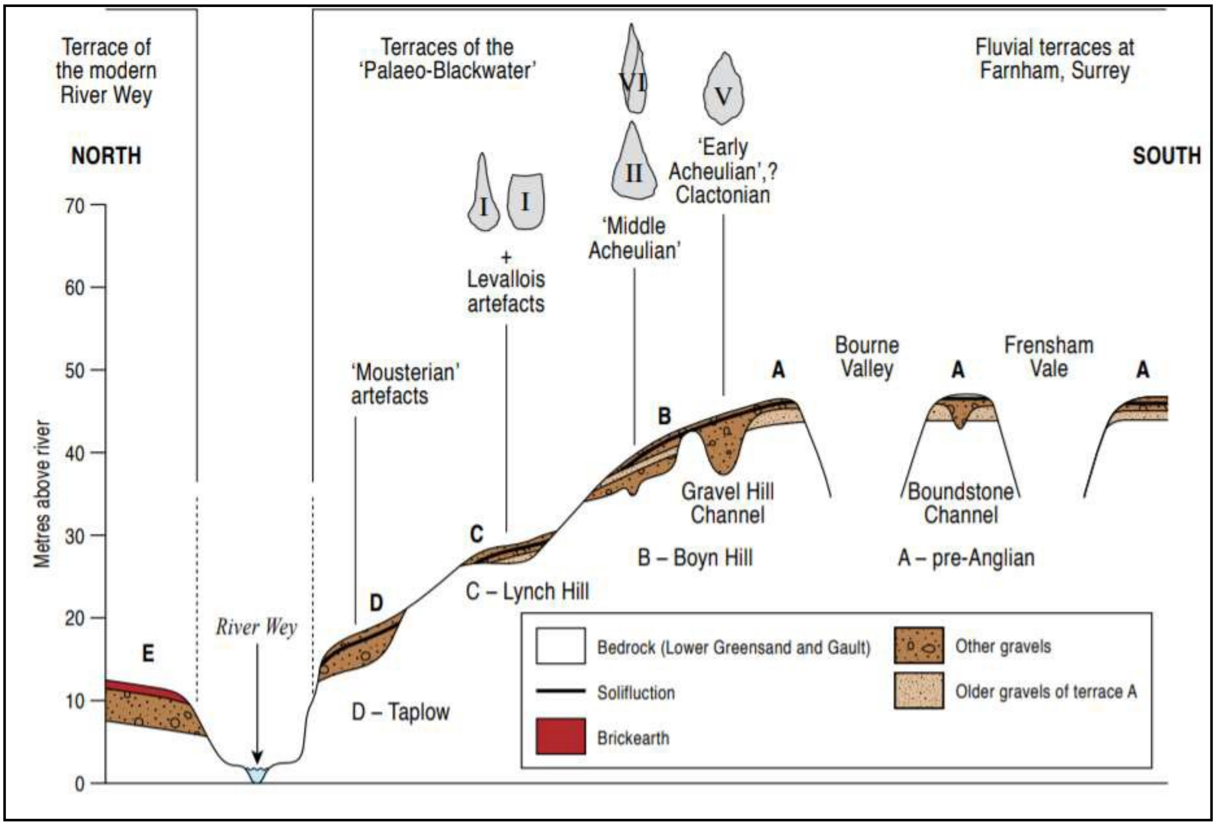


Figure 3.28. The Farnham terrace staircase (after Wymer 1999) with chronologically significant archaeology marked by Bridgland & White (2018).

Archaeology review.

Artefact numbers are shown below in table 3.21, based on the TERPS database rather than Roe's Gazetteer (the former provides additional geological detail which allows attribution to the C terrace).

Table 3.21. Farnham (C terrace) Lower Palaeolithic archaeological inventory from TERPS database.

Locality	**Handaxes (including roughouts)**	**Cores and flakes**	**Levallois cores and flakes**
Farnham (Morley Road Pit)	1	0	1
Farnham (Patterson's Pit)	1	0	0
Farnham (Tilford Road Pit)	5	0	0
Farnham (Wakeford's Pit)	7	0	0
Farnham (Culverland's Pit)	1	0	0
Farnham (Upper Snailslynch Pit)	16	0	1
Farnham (Elsmore's Pit)	12	6	0

Farnham (Patterson's Pit)	6	0	0
TOTAL	49	6	2

'Farnham C', an assemblage formed of the archaeology from a number of pits at similar height O.D., is not a large even when all the pits are considered together. Wade & Smith (1934) figured two handaxes from Elsmore's Pit – perhaps significantly, these were a well-made ficron (found 1.8m from the base of the section) and cleaver (found at the base of the section just above the Lower Greensand). These are shown in figure 3.29.

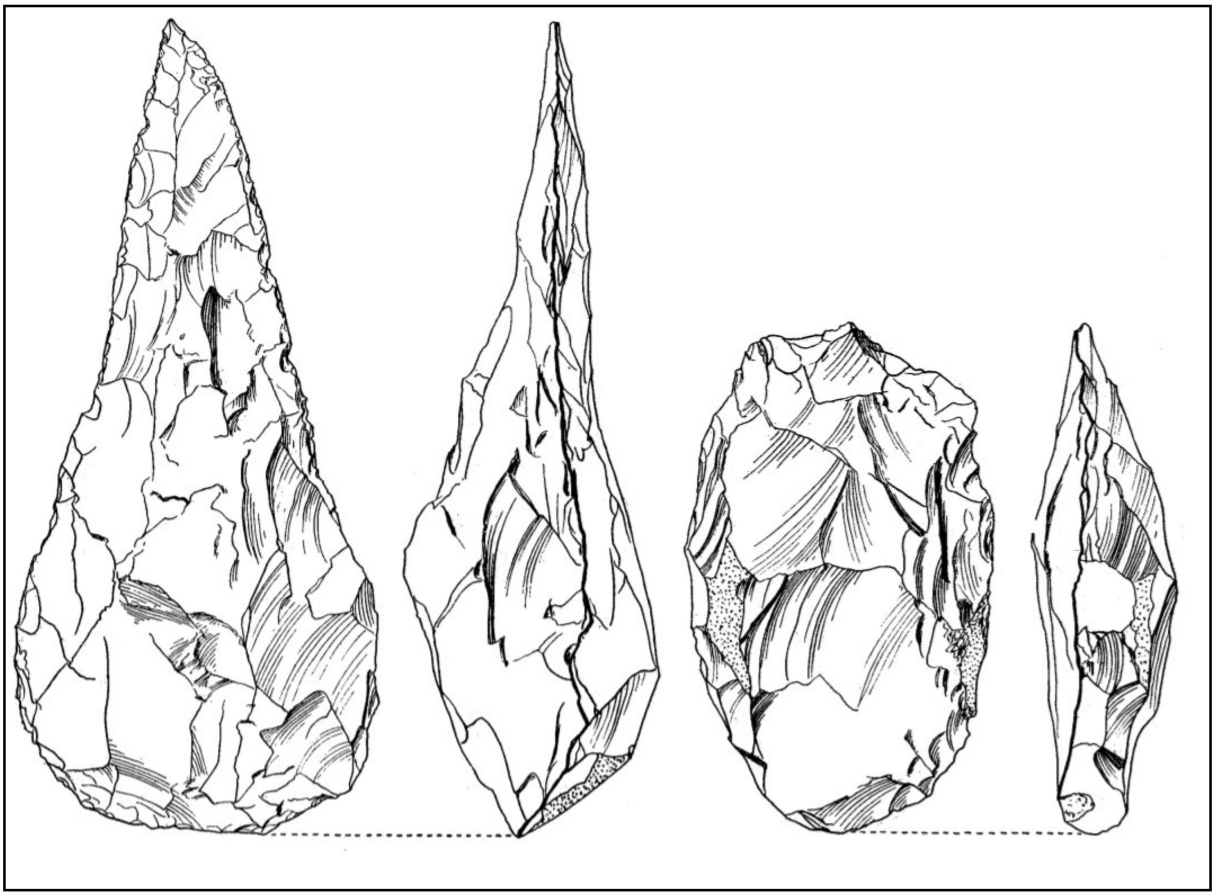


Figure 3.29 A ficron (left) and cleaver (right) from Elsmore's Pit. No scale was given, although the ficron was around 22.9cm long (Wade & Smith 1934).

Bridgland & White (2018) reviewed the archaeology contained within the Farnham terraces, with emphasis on the chronological significance of the handaxe morphologies present. They noted that the Group I character of the Farnham C handaxes, combined with the first appearance of Levallois technology within the C terrace, invited comparison with the Lynch Hill terrace of the Thames.

Sample.

27 handaxes were measured, principally from the BM (Wade) collection.

3.6. The Medway and Kentish Stour.

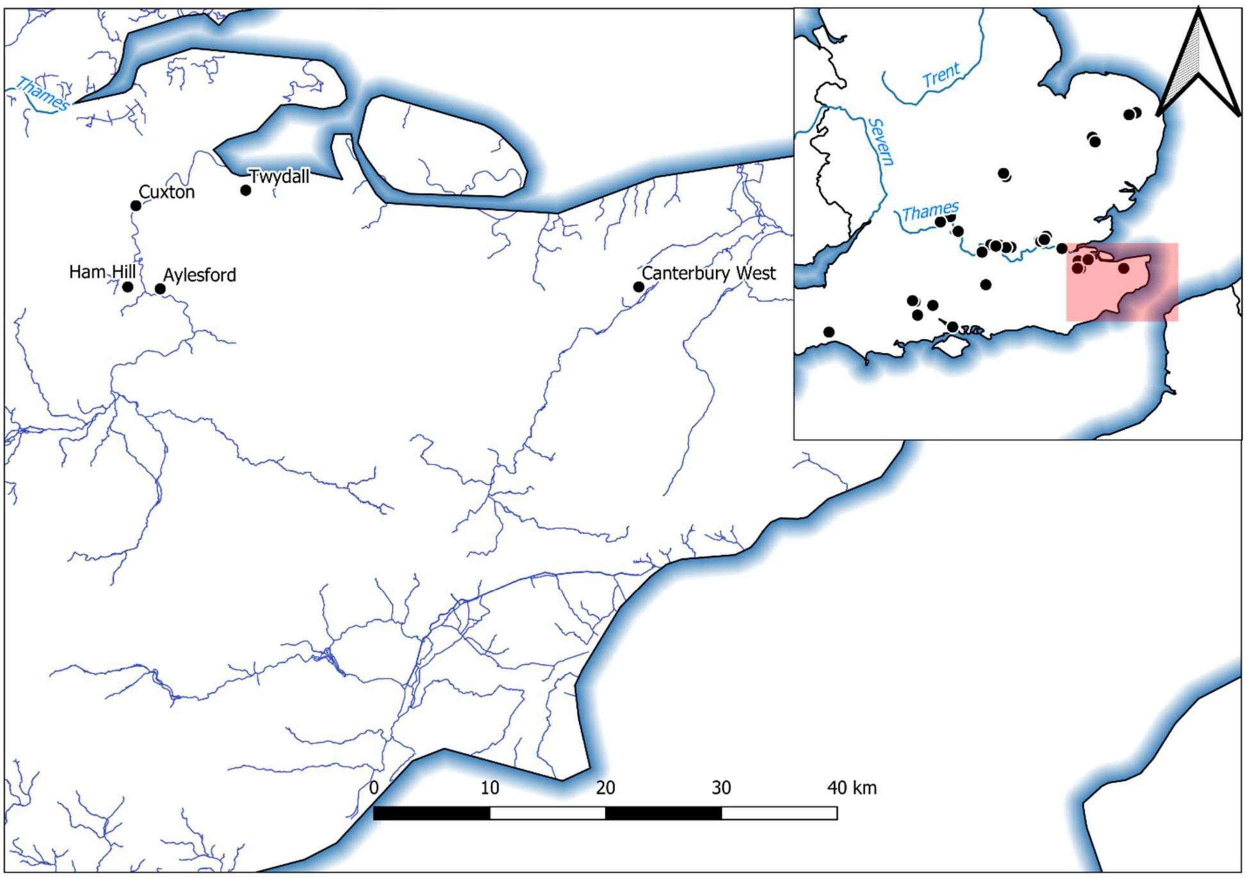


Figure 3.30 The Medway and Stour map.

3.6.1. CUXTON, Kent. (TQ 710 665)

Site History.

Palaeolithic archaeology has been known from Cuxton since 1883 (Payne, 1893, cited in Tester, 1965). The first formal excavation was conducted by P.J. Tester between 1962 and 1963 in three trenches at the Rectory site to the west of Rochester Road, (Tester, 1965). Further excavations were conducted by J. Cruse and colleagues in 1984 (Cruse 1987). The most recent investigation was part of the Medway Valley Palaeolithic Project (MVPP), conducted in 2005 (Wenban-Smith, 2004, 2006, 2007) (figure 3.31). The MVPP aimed to date terrace deposits in the Medway Valley, to source historic artefact collections to the various Medway terraces, and to characterise the typological and technological changes in the area over time. The handaxes assessed in this study are primarily from Tester's excavation, supplemented by handaxes from the garden of a Mr Cogger recovered during the Cruse excavations.

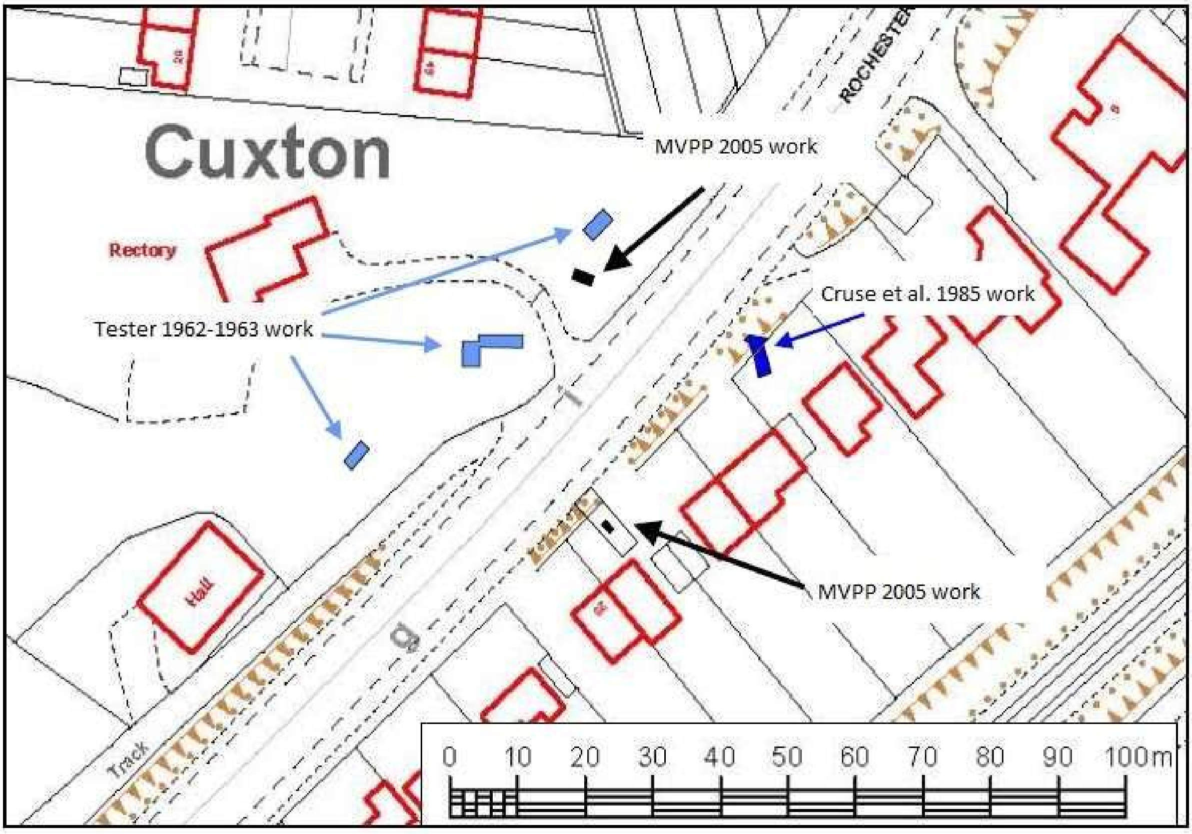


Figure 3.31 A map showing the Cuxton excavations, after Wenban-Smith (2004).

Geology and Stratigraphy.

The most complete stratigraphic sequence was provided by Cruse (1987), a south facing section from his Trench 2 (Figure 3.32).

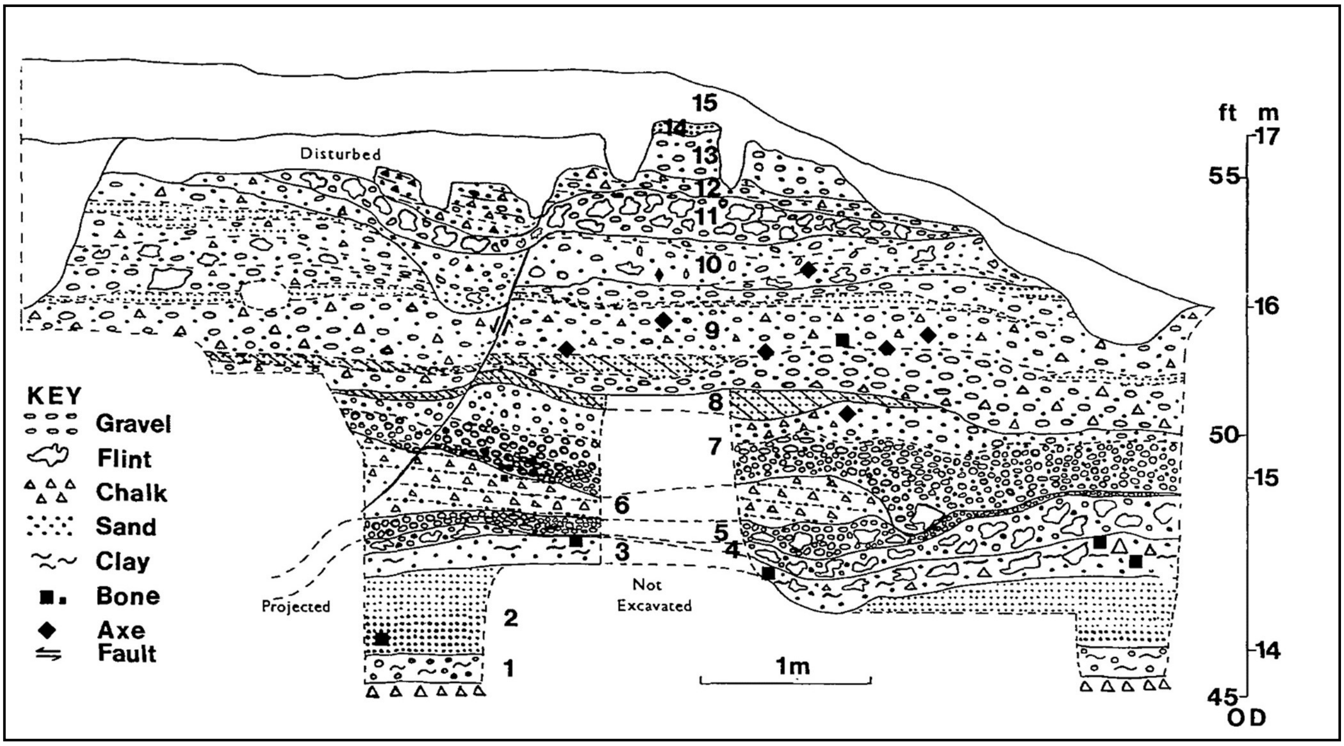


Figure 3.32. A stratigraphic section through the south-west face of Cruse's Trench 2, examined by D.R. Bridgland (figure from Cruse 1987, Fig. 2.1).

Table 3.22 shows a summary of the stratigraphy recorded at Cruse's Trench 2 (figured in figure 3.32).

Table 3.22. A brief description of the stratigraphy in Cruse's Trench 2 (after Cruse 1987).

Bed (Cruse 1987)	Description.
15	Top soil.
14	Redeposited aeolian sands and silts.
13	Unbedded grey, sandy gravel.
12	Bedded, fine chalky gravel.
11	Unbedded, very coarse dark gravel.
10	Unbedded, coarse gravel.
9	Planar bedded, sandy gravel with lenses of sand and chalky gravel.
8	Cross stratified, gravelly sand.
7	Planar bedded gravel.
6	Cross bedded, gravelly sand.
5	Dark, partially clast supported fine gravel.
4	Orange-yellow, very coarse, slightly clayey gravel.
3	Gray clayey sand.
2	Yellow sand with clay lenses.
1	Chalk rubble (presumed upper surface of chalk bedrock).

All three investigations noted a bedrock of chalk or chalk rubble, overlaid by a sequence of fluvial sediments (cycles of sand and gravel), overlaid by loam and made ground. Bridgland suggested that the gravels were formed in a braided river channel in cool conditions (in Cruse 1987). Palaeocurrent measurements taken from the two main cross-bedded sand bodies (layers 6 and 8) showed a flow direction consistent with deposition by the Medway. Clast lithological analysis, which showed evidence of lithologies found higher in the Medway's course, confirmed the Medway association of the deposits.

Terrace stratigraphy.

Cuxton is located on a relict band of gravel situated on a spur of chalk between the Medway and a tributary valley of an extinct northwest flowing stream (Wenban-Smith, 2004). The fluvial deposits can be confidently ascribed a Medway origin, but the position of the Cuxton deposits in relation to the mapped Medway terraces (and correlation with the Thames terraces) is an important consideration given the lack of other dating evidence and has provoked considerable debate since Tester's initial investigation. The surface height of the terrace is known at 18.5m O.D., but altitude correlation in this part of the Medway (the Medway Gap) is considered unreliable (Pettitt and White, 2012), partly due to the difficulty of correlating upstream and downstream parts of the Medway terraces across the Medway Gap, a constricted valley reach. Dines *et al.* (1954) and Tester (1965) suggested correlation with Terrace 2, but Bridgland (1996) placed Cuxton on Terrace 3, analogous to the Lynch Hill/ Corbets Tey formation of the Thames (MIS 10/9/8). Crucially, Bridgland (1996; 2003) placed Cuxton on the Medway terrace *below* Terrace 4, despite both Terraces 3 and 4 being broadly analogous to the Thames Lynch Hill/ Corbets Tey terrace (figure 3.23); this perhaps suggests that the deposits at Cuxton represent a small fragment at the base of a much larger aggradation, now eroded away. As part of the MVPP, Wenban-Smith et al., (2007) correlated Cuxton with the Medway Terrace D/E, using the lettered terrace nomenclature which applies to the more expansive gravel spreads upstream of the Medway Gap. This position, intermediate between Terraces D and E, would make Cuxton somewhat younger than the nearby sites at Aylesford and Ham Hill (see below).

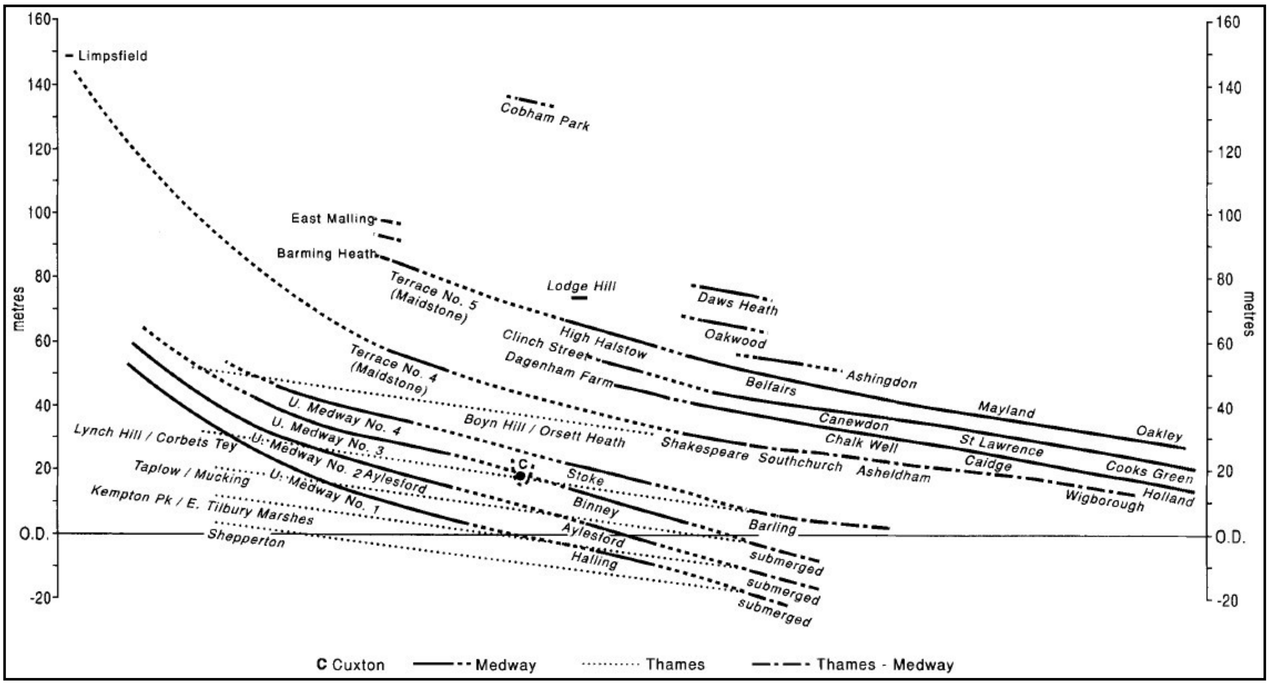


Figure 3.23. Long-profile terrace correlations for the Medway, Thames, and submerged Thames-Medway rivers (from Bridgland 2003).

(Cruse 1987) identified fragments of elephantid, *Equus* sp., *Bos* sp., and/or *Bison* sp., none of which is diagnostic in understanding the time range or environment in which the Cuxton deposits formed. OSL samples were obtained during the MVPP excavation, which produced dates of 232.64±13.75 ka (early MIS 7) (Wenban-Smith *et al.*, 2007). The OSL dating was initially considered to be 'reliable' but has since been revised to a late MIS 8 age (Bates *et al.*, 2014). Even accounting for slightly underestimated ages (which seems to be common with OSL dating), this would make Cuxton one of the youngest handaxe dominated sites in Britain (Bates et al. 2014).

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Cuxton held in UK institutions. These are shown in table 3.24., however it must be noted that artefact numbers have increased since 1968.

Table 3.24. Cuxton Lower Palaeolithic archaeological inventory (Roe 1968b).: excavations after 1968 have increased the archaeological inventory considerably (Roe 1968b).

Locality	**Handaxes (including roughouts)**	**Cores and flakes**	**Levallois cores and flakes**
Cuxton (Vicarage Garden)	218	486	9
TOTAL	218	486	9

Tester's excavation recovered 657 artefacts including 199 handaxes from the gravel in his trenches 1, 2 and 4, largely in fresh condition. These included mostly pointed forms with several ficrons and 11 cleavers, in addition to over 50 flake tools. Cruse's excavation recovered a further 310 artefacts including a non-handaxe (Mode I) assemblage sourced from the lower part of the gravel (beds 2 – 6), consisting of flakes, cores and flake-tools, and a handaxe assemblage consisting of 16 handaxes and 2 handaxe fragments from the upper part of the gravel (beds 7 – 15; probably a continuation of Tester's gravel), separated by a depositional hiatus (see Cruse 1987). The handaxes matched the typology of Tester's earlier investigation, and both bands of artefacts were correlated with Tester's Rectory site (the assumption being that the bedding at the Rectory site was too thin to differentiate between the handaxe and non-handaxe technology). In addition, Wenban-Smith's MVPP dig recovered over 20 handaxes including the one of the largest found in Britain (MacRae 1987; Wenban-Smith 2004). Tester (1965) found 3 Levallois flakes, and 5 artefacts described as 'proto-Levallois' (the credentials of which have been confirmed by A. Rawlinson (*pers. comm*. 10.12.2020; Rawlinson 2021)). A suggested MIS 9 age for Cuxton would be consistent with other sites (e.g., Purfleet), which suggest the introduction of Levallois towards the end of MIS 9 (e.g., Schreve et al., 2002; Westaway et al., 2006; Bridgland et al., 2013). The tripartite succession of core-and-flake (Mode I), handaxes (Mode II) and proto-Levallois (Mode III) was identified at the type-site of Purfleet (Bridgland et al. 2013) and may also be chronologically significant.

The Cuxton handaxe assemblage featured in Roe's (1968a) morphometric assessment where it was sorted into his Group I. Roe's analysis was supported by Callow (1970), who performed a multivariate statistical analysis on British and European handaxe sites. He found Cuxton shared morphological similarities with Baker's Farm and more generally to other sites in Roe's Group I. The assemblage was analysed through the lens of White's (1998) raw materials hypothesis in Shaw & White (2003), where the local 'burrow flints' were suggested to place controls on the observed handaxe morphologies (an example is shown in figure 3.33 below).

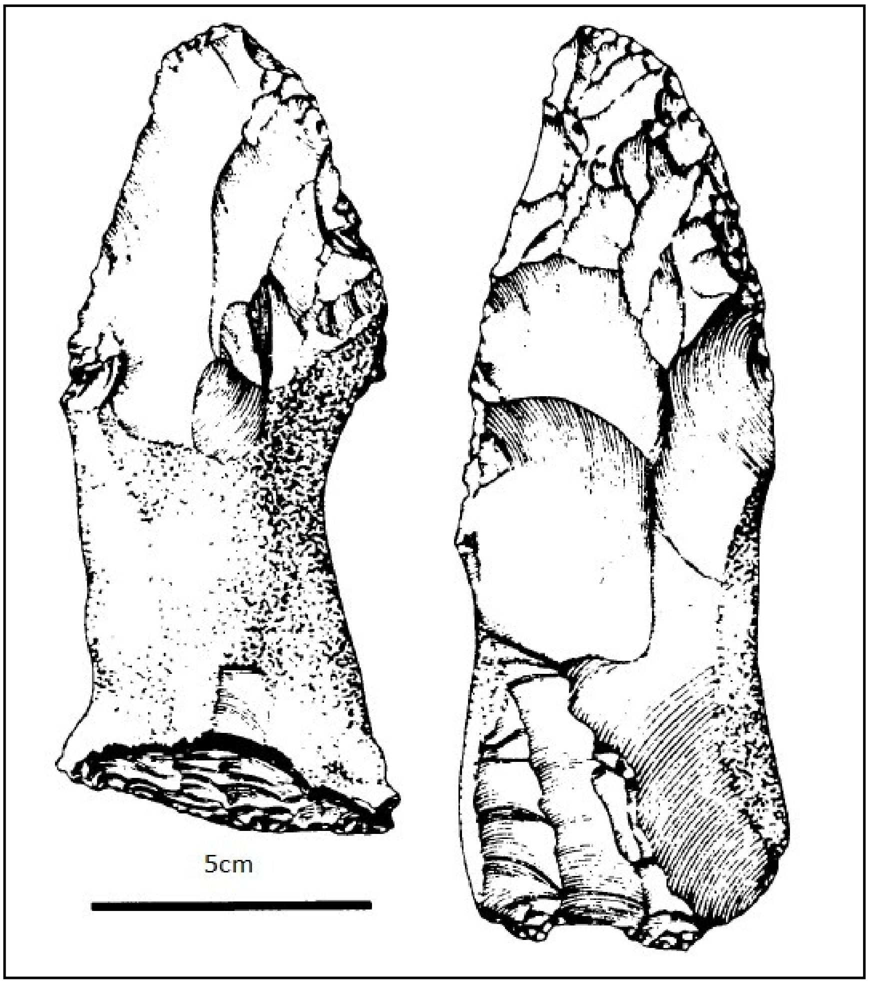


Figure 3.33 Cuxton handaxes made on burrow flint, from Shaw & White (2003).

Sample.

197 handaxes in the BM Tester and Cogger collections were assessed.

3.6.2. AYLESFORD, Kent (Various locations; Silas Wagon's Pit TQ 730 593).

A number of poorly described gravel pits around Aylesford produced a relatively large handaxe assemblage. Known pits include Silas Wagon's Pit, Niko Pit and Bryce's Sand Pit, although many more are only generally provenanced to Aylesford (TERPS). The pits in the Aylesford area may represent a wide chronological range, but it is likely that the handaxes were found in pits such as Silas Wagon's Pit and Niko Pit on Terrace D, attributed to MIS 9 (Wenban-Smith et al., 2007, 2019). A moderately large collection of handaxes from Aylesford (n=87) was located at the BM, derived from various collections. A limited analysis of this material was included in the present study.

Roe (1968b) provided an account of the numbers of artefacts from Aylesford held in UK institutions. These are shown in table 3.25.

Table 3.25. Aylesford Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Aylesford (General)	324	19	9
Aylesford (Nickel Pits)	8	1	0
Aylesford (Preston Hall)	8	0	0
Aylesford (Wagon's Pit)	43	6	0
TOTAL	383	26	9

3.6.3. HAM HILL (Snodland), Kent. (TQ 702 595).

The site was probably located to the west of a number of pits at New Hythe and may also have been referred to as Snodland. Very little information is published on this site, but the Medway Valley Palaeolithic Project placed it on the Medway terrace D, which possibly formed during MIS 9 (Wenban-Smith et al., 2007, 2019). A small collection of handaxes from Ham Hill (n=19) was located at the BM, mostly in the Burchell collection, and a limited analysis of this material was included in the present study.

Roe (1968b) provided an account of the numbers of artefacts from Ham Hill held in UK institutions. These are shown in table 3.26.

Table 3.26. Ham Hill Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Ham Hill (Snodland)	20	3	1
Snodland	23	0	0
TOTAL	43	3	1

3.6.4. CANTERBURY WEST, Kent. (TR 143 589)

Site History.

Dr T.A. Bowes, a general practitioner and archaeologist based in the Herne Bay area, collected a large number of palaeoliths from the Canterbury area in the first half of the twentieth century. The provenance of these artefacts was obfuscated, firstly by Bowes himself through his use of secretive 'codes' to refer to the pits his artefacts originated from, and secondly by the flooding of the basement of the Herne Bay Museum in 1949 and 1953, which removed many of the artefact labels. The location of Bowes' site referred to as 'Canterbury West' has only recently been reidentified as the Cozens & Sons Brick Works through thorough documentary research by Peter Knowles, a curator at the Herne Bay Seaside Museum and Durham University PhD student. The site was built over by housing.

Geology and Stratigraphy.

Dewey & Smith (1925) described a sequence of 'blue clay' bedrock, overlaid by coarse, reddish, current-bedded gravel containing seams of sand and loam, overlaid in turn by a reddish-yellow brickearth. They recorded that the gravels were 3.66 – 4.27m thick and composed almost entirely of flint. The BGS maps the position of the former Cozens & Sons Brick Works as Kentish Stour terrace 2 river gravels. The absence of biostratigraphic age correlations for the Stour terraces makes dating the site difficult (Knowles forthcoming).

Terrace stratigraphy.

Knowles (forthcoming) followed Bridgland et al. (1998d) in applying Maddy's (1997) uplift rate of 7cm/ 1000 years to make a 'very coarse' estimation of the terrace levels around Canterbury (shown below, with MIS glacial-interglacial cycles added by the present author to accommodate for the considerable uncertainty in ages):

- Fordwich (46m OD) ~657 Ka (MIS 16 – 15 – 14)
- Reculver Gravels (30m OD) ~410 Ka (MIS 12 – 11 – 10)
- Sturry Gravels (25m OD) ~357 Ka (MIS 10 – 9 – 8)
- Canterbury West site (20m OD) ~286 Ka (MIS 8 – 7 – 6)
- Chislet site (10m OD) ~143 Ka (MIS 6 – 5 – 4)

The presence of *C. fluminalis* at Chislet, on the lowest exposed terrace, indicated a pre-Ipswichian date, whilst the mammalian assemblage would seem to point to a pre-MIS 7 age (Bridgland et al. 1998d). AAR ratios from Chislet generally fall within the range of MIS 7 (Bowen 1998). Given that the faunal assemblage does not appear to be reworked, this discrepancy is unexplained, but the lowest terrace must be older than simple uplift modelling would suggest. Bridgland et al. (1998d) suggest that the rate of downcutting of the Stour may have slowed significantly in the Middle Pleistocene, resulting in the relatively ancient Chislet faunal assemblage occurring only ~10m above the valley floor. Following Bridgland's climatic model of terrace formation, each terrace 'step' on the staircase can simply be pushed back one interglacial cycle assuming Chislet does indeed date to MIS 7 (making Canterbury West MIS 9, Sturry MIS 11 etc.) The appearance of Levallois towards the top of the sequence at Sturry may indicate an MIS 9/8 age (this is in approximate agreement with uplift modelling) (Bridgland et al., 1998d), however the credentials of the Sturry Levallois have been challenged (Rawlinson 2021). Fordwich (c. 46m O.D.), with its Group V handaxe assemblage, may date to MIS 15 - 13 (Bridgland et al., 1998d). Further work is required to resolve the chronology of the Stour terraces.

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Canterbury West held in UK institutions. These are shown in table 3.27.

Table 3.27. Canterbury West Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	**Handaxes (including roughouts)**	**Cores and flakes**	**Levallois cores and flakes**
Canterbury (West)	25	1	0
TOTAL	25	1	0

Knowles (forthcoming) provided the only detailed analysis of the Canterbury West site. Whilst acknowledging the limitations of the small sample size and insecure provenance, Knowles identified remarkable similarities with the nearby site at Cuxton 48km to the northwest. He drew comparisons between the extremely large ficrons and abundant cleavers at Canterbury West and similar artefacts which are a celebrated part of the Cuxton assemblage (Wenban-Smith 2004, 2006). Knowles pointed to the similar situation of Cuxton and Canterbury West, insofar as both are on the lower terraces of their respective river terrace staircases, as corroborating evidence for broad contemporaneity.

Sample.

A total of 17 handaxes from the HBSM Bowes collection were assessed.

3.6.5. TWYDALL, Kent. (TQ 805 677)

Site History.

The Twydall chalk pit was worked between 1900 and 1930. The earliest collection of artefacts was made under unusual circumstances by G. Baker and G. Payne, beginning in 1908 (Payne 1915). They collected artefacts from a raised light-tramway connecting the original Twydall chalk pit with a cement works on Horrid Hill, an island in the Medway Estuary. The tramway was constructed using coombe rock derived from the chalk pit, which was unusable for cement production but rich in palaeoliths. These palaeoliths were collected from the estuarine beach on either side of the tramway (Payne 1915). Further collection from Twydall was made by W.H. Cook and J.R. Killick in the winter of 1909 – 1910 (Beresford 2019). Unlike the earlier finds, these artefacts were found in the quarry itself. Collections were made from the estuary into the 1950s (Beresford 2019).

Geology and Stratigraphy.

Whittaker (1990) observed a variable thickness of up to 2m of Quaternary deposits overlying chalk bedrock. He described a series of shallow channels cut into the underlying chalk, in-filled with laminated sands and interpreted as a series of braided channels. He also described solution hollows filled with poorly-bedded weathered chalk and dark soil within a light brown loam matrix. Payne (1915) speculated that artefacts may have accumulated in these hollows during solifluction, but his investigation of one such feature revealed no archaeology. Cook and Killick recorded brickearth over the channels (in Beresford 2019). Beresford (2019) suggested that the channel features related to eastward flowing tributaries which originally fed into the proto-Medway. Bridgland (2003) suggested that there was no clear evidence that the Twydall artefact assemblage originated from fluvial deposits at all, although he has since noted the possibility that decalcified chalky fluvial gravels can appear similar to solifluction deposits (D.R. Bridgland *pers. comm*. 15.12.2020).

There is little independent geological evidence of the age of the Twydall deposits, which proved problematic when justifying its selection as a site in this study. It was included on the grounds that it had previously been suggested as a possible MIS 9 site (Beresford 2019) although in this case based almost entirely on the handaxe morphology. Roe (1968a) had noted that Twydall was 'perhaps' situated on a 100-foot terrace, in common with the well-established MIS 9 sites at Furze Platt and Baker's Farm.

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Twydall held in UK institutions. These are shown in table 3.28.

Table 3.28. Twydall Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Twydall (Quarry)	91	322	0

Twydall (Sharps Green)	6	9	0
TOTAL	97	331	0

Roe (1968a) assigned Twydall to his Group I, where the site formed a tight cluster with his Cuxton and Whitlingham samples in terms of average elongation and tip-shape values. Roe (1981) postulated that three industries may have been represented at Twydall; a basal 'Clactonian' core-and-flake assemblage, a large Acheulean assemblage, and an upper assemblage comprising a handful of flakes and a core with Levallois characteristics, offering further support for an MIS 9 age attribution. This tripartite scheme bears a tantalising resemblance to the significant sequence represented at Purfleet and perhaps Cuxton, however it must be treated with extreme caution as the provenance of the artefacts is generally not known, and Roe's use of 'Clactonian' in this case appears to simply refer to cores and flakes (which are often a part of Acheulean assemblages) (Beresford 2019). Beresford (2019) also noted the consistency of the technology and typology of his sample with Roe's Group I.

Sample.

43 handaxes were analysed in this study, most from the BM Warren collection (n=22) with others from the BM Burchell, Wellcome and Turner collections. 5 were from the CAA Burchell collection.

3.7. The Great Ouse.

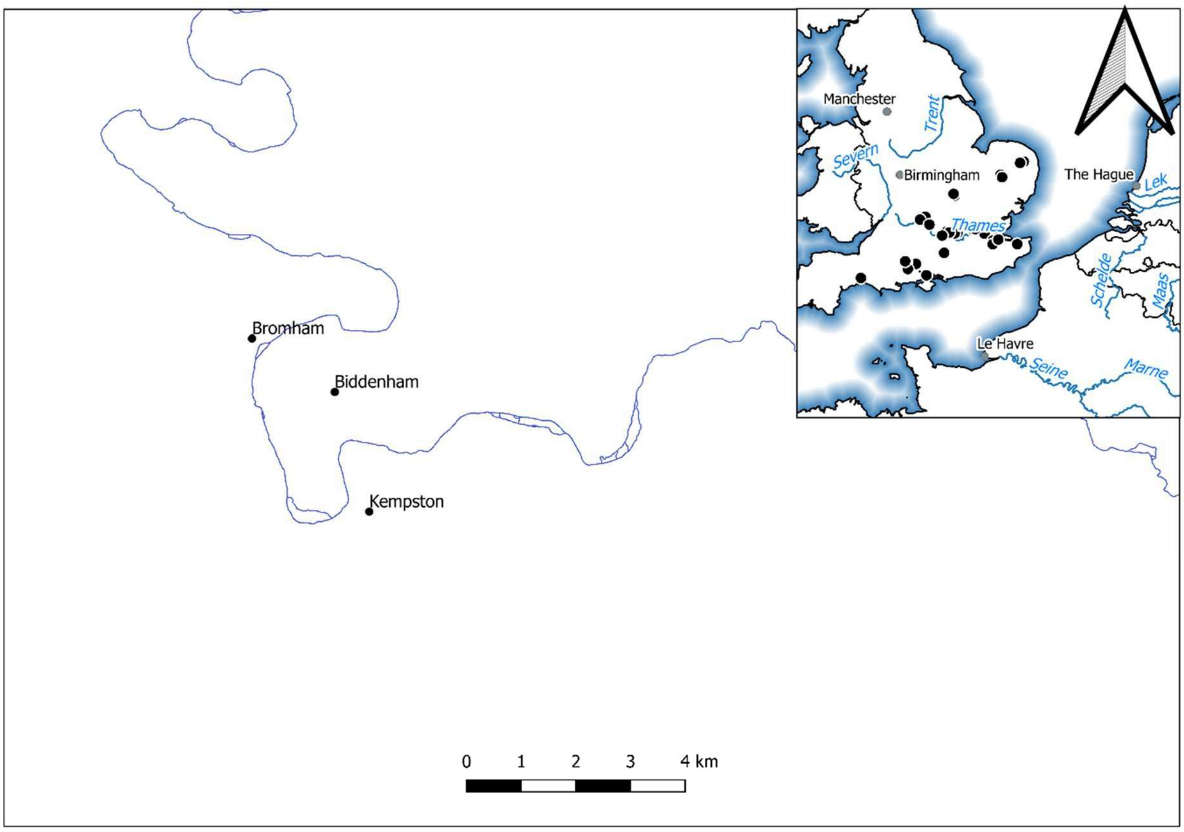


Figure 3.34. Great Ouse map.

3.7.1. BIDDENHAM, Bedfordshire. (TL 025 500)

Site History.

Palaeoliths were first found by Wyatt in 1861, in gravel pits on either site of the Bromham Road, Biddenham (Wyatt 1861, 1862). His later discoveries were made at the Deep Spinney Pit on the south side of the road (Wyatt 1864; Wymer 1999). Early accounts of Biddenham were also made by Prestwich (1861, 1864) and Evans (1897), who reported a site rich in palaeoliths, mammalian and molluscan remains. The site was reinvestigated in April 1986 under the GCR, which provided a geological context for the deposits (Harding et al. 1991a).

Geology and Stratigraphy.

Evans (1872) described an extensive spread of subangular, ochreous gravel around Bedford. A more complete description in Harding et al. (1991) described a sequence of a basal 'lag' gravel overlaid by alternating beds of sandy gravel and shelly, sandy clays with laminated shelly clays towards the top of the sequence.

Terrace stratigraphy.

Both Biddenham and Kempston are situated on the third terrace of the Great Ouse (Rogerson 1987; Wymer 1999), which Harding et al. (1991) suggested pointed to a Middle Pleistocene age. Wymer (1999) dated the underlying boulder clay to the MIS 12 glaciation, meaning the Biddenham and Kempston interglacial deposits must post-date the Anglian glaciation. Harding et al. (1991) suggested an age range of MIS 10 – 8, based on the mixed character of the archaeology at Biddenham which includes Clactonian, Acheulean and Levallois elements and which they likened to the archaeology of the Lynch Hill – Corbets Tey Terrace of the Thames. The dating of Terrace 3 to MIS 9 has since been widely, if cautiously accepted (Pettitt & White 2012; Boreham et al. 2010; McNabb 2011), although the terrace stratigraphy in the region is still unclear in places. An idealised Great Ouse terrace stratigraphy is shown in figure 3.35.

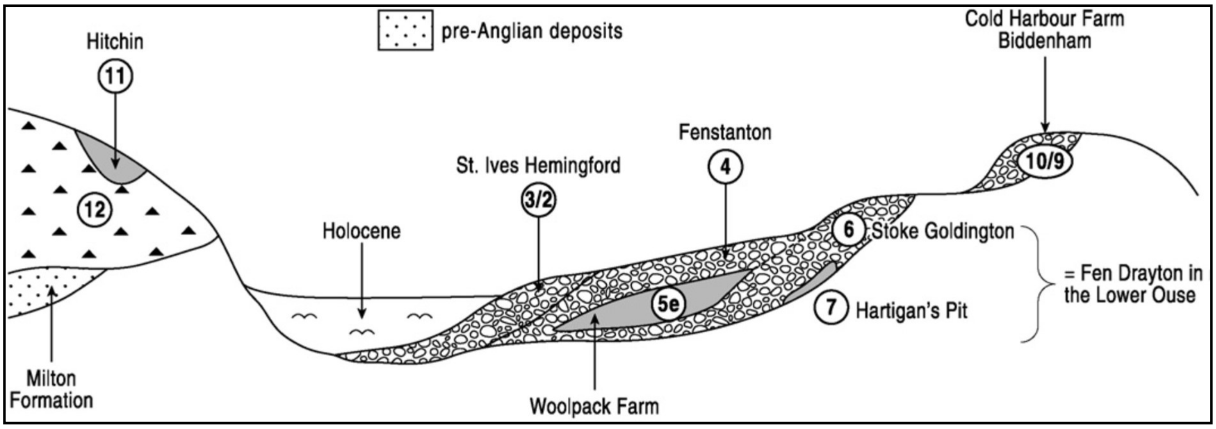


Figure 3.35 An idealised section of the Great Ouse terraces, showing Biddenham on the high terrace (terrace 3). From Boreham et al. (2010) after Gao (1997) and Boreham (2002).

The temperate character of the fine-grained sediments overlaying the lag gravel might indicate fully interglacial climatic conditions (i.e., MIS 9e, see below). This suggests that the archaeology, which is seldom in fresh condition, should pre-date the fine-grained interglacial sediments.

Biostratigraphy, climate and environmental reconstruction.

Kennard & Woodward (1922) described 20 mollusc species at Biddenham, which increased to 46 species in Harding et al.'s (1991) investigation. The diversity of mollusc species above the lag gravel suggested a temperate climate and the presence of *B. marginata* is consistent with, although not diagnostic of, an MIS 10 – 8 age (Keen 2001). Mammalian bones are noted to have been abundant in the lower gravel (Wyatt 1864), but the cooccurrence of temperate (e.g., *P. antiquus*) and cold-climate species (e.g., *Mammuthus primigenius*) suggest either a vertically mixed mammalian fauna or material for which the provenance was not recorded.

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Biddenham held in UK institutions. These are shown in table 3.29.

Table 3.29. Biddenham Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Biddenham (general)	320	324+	23
TOTAL	320	324+	23

The base of the basal gravel was suggested to be the most productive in terms of archaeology (Wyatt 1862; Harding et al. 1991a). Wymer (1999) pointed out that 'Biddenham and Kempston are mainly unprovenanced [and] it would not seem wise to make any conclusions from them'.

Roe noted both the high yield of palaeoliths from Biddenham and the mixed technological nature of the assemblage, with pointed handaxes and 'proto-Levallois' cores and flakes present (Roe 1981). This prepared core technology is perhaps the strongest dating evidence available for Biddenham. Evans (1897) figured a Biddenham handaxe which appears to have been produced on burrow flint (figure 3.36), recalling similar handaxes with cortical 'grips' or 'handles' from Cuxton (shown in figure 3.33) (Shaw & White 2003; this study).

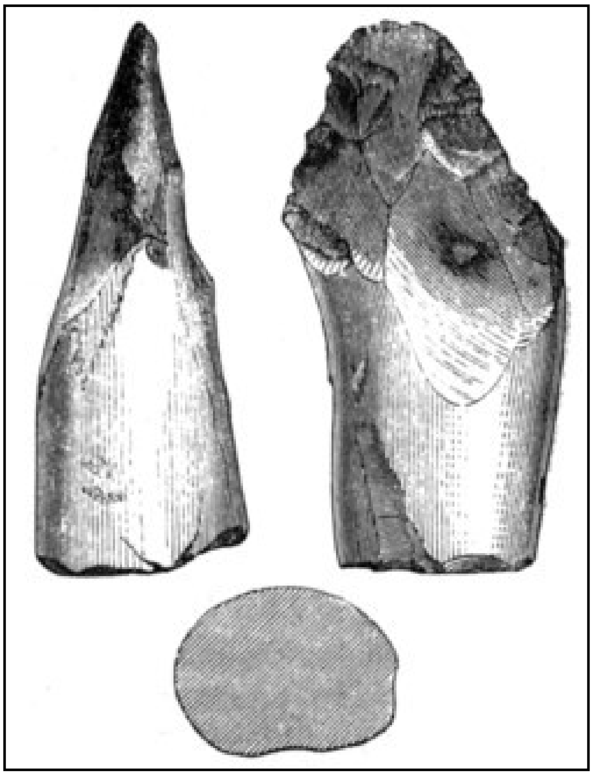


Figure 3.36 A handaxe from Biddenham, Beds. figured in Evans (1897).

Sample.

A total of 119 handaxes were analysed, principally from the PRM Knowles collection (n=69) and BM Wyatt collection (n=46).

3.7.2. KEMPSTON, Bedfordshire. (TL 031 478)

Site History.

James Wyatt briefly described Kempston, not long after his initial descriptions of Biddenham (Wyatt 1861, 1862). Evans considered it to be a prolific source of palaeoliths in the Bedford area (Evans 1897). It has never been formally excavated and is virtually unpublished.

Geology and Stratigraphy.

No geological investigation of the site has taken place. Wyatt (1862) examined sands 'beneath the gravel', which he found to contain a range of mollusc species along with 'a flint implement'. He also recorded an 'upper gravel', which contained flint flakes. This contrasts with observations made at Biddenham, where the artefactual horizon was very likely at the base of the lower gravel. This is stated even more plainly in Wyatt (1861), where he mentions that 'some of' the Kempston Pits were never excavated to the lower gravel, as it was too sandy for use in road building and prone to inundation.

Terrace stratigraphy.

Kempston is situated on the same terrace level as Biddenham, on the opposite bank of the Great Ouse (Wymer 1999).

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Kempston held in UK institutions. These are shown in table 3.30.

Table 3.30. Kempston Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Kempston (general, probable King Street (TERPS))	454	292	10
Kempston (Foulke's Pit)	67	22	1
Kempston (other)	33	9	1
TOTAL	545	323	12

The assemblage from Kempston is a poorly studied resource: tellingly, Roe (1981) simply described the Kempston handaxes as being 'similar to Biddenham'. A single example of repatination is cited in Brumm et al. (2019) as evidence of tool scavenging, but this behaviour is not widely evident and there is no evidence that this represented a habitual behaviour at the site.

Sample.

A total of 156 handaxes were analysed, all from the BM W.G. Smith collection.

3.7.3. BROMHAM, Bedfordshire. (Possibly TL 010 510)

The site at Bromham is unpublished, and there is no clear record of the circumstances of collection, the geological context, or the age of the assemblage. Its inclusion here is based on the situation of Bromham village close to the Great Ouse sites of Biddenham and Kempston and that the Bromham pit (or pits) may have exploited deposits of a similar age to those sites, although this is by no means certain. A modest collection of handaxes (n=25) were located in the BM with the general provenance of Bromham, Bedfordshire. The handaxes in the present sample were all from the BM, and were mostly purchased from R. Turner, although a single example is recorded as having been found by Wyatt in 1864. Only three Bromham handaxes feature in Roe's Gazetteer (Roe 1968b).

3.8. East Anglia – the Yare and Little Ouse.

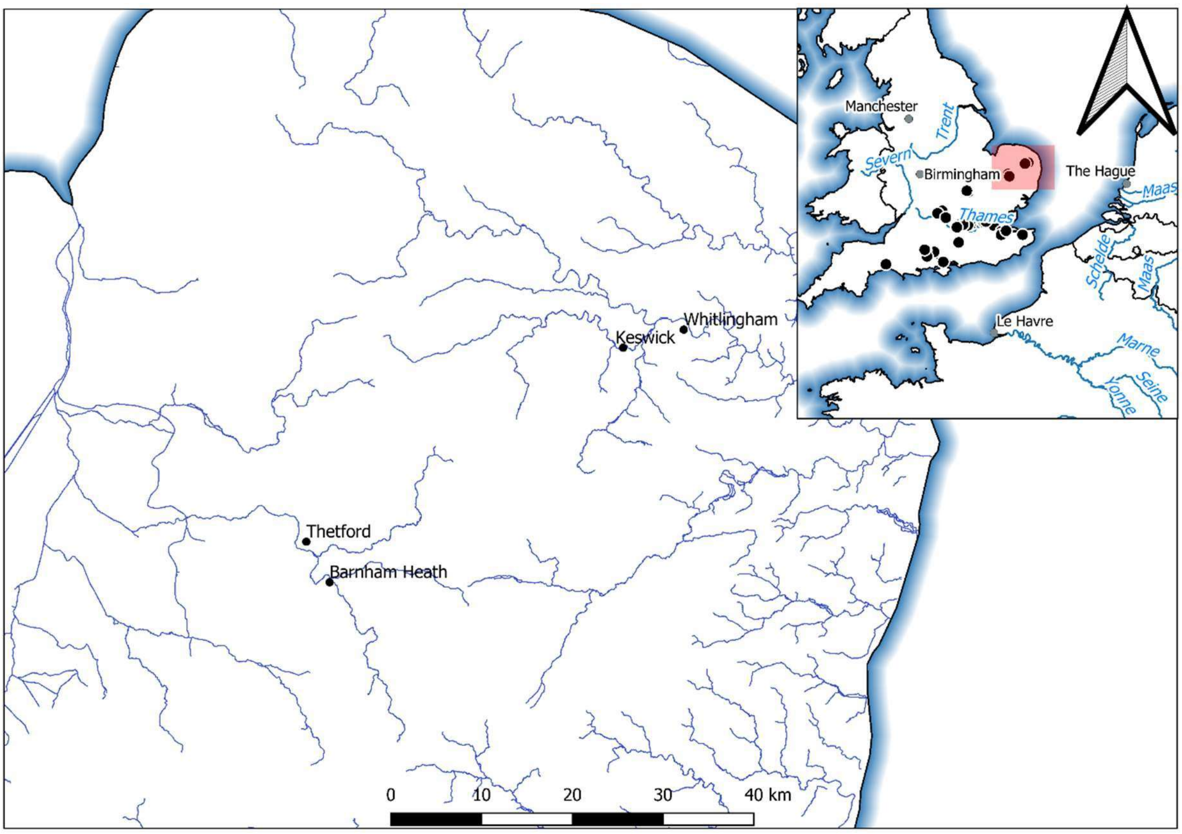


Figure 3.37. East Anglia map.

3.8.1. WHITLINGHAM, Norfolk. (TG 281 070)

Site history.

Whitlingham was commercially worked for gravel from 1926 (Wymer 1985). J.E. Sainty and H.H. Halls who undertook a formal excavation of the site which provided a wealth of geological and archaeological information (Sainty & Boswell 1926; Sainty 1933). The pit was closed by 1972 and the site has not been revisited since although sporadic discoveries of handaxes continued into at least the 1950s (Wymer 1985).

Geology and Stratigraphy.

Sainty & Boswell (1926) described a sequence of sands, gravels and clays (locally called 'the uncallow') overlying chalk bedrock. They interpreted the deposits as having been formed on the banks of a braided river channel.

Terrace stratigraphy.

Whitlingham is situated on the '50' terrace' of the Yare (Roe 1968a), in common with Keswick. However, the terraces of the Yare remain under-researched and secure correlations are lacking (Holmes et al., 2018). Evidence for the age of the Whitlingham deposits is limited. Pettit & White (2012) suggested a broad post-Anglian age attribution (MIS 11 – 9). The presence of Levallois technology at nearby Keswick (see below) might be taken to imply an MIS 9 age (White et al., 2018).

Biostratigraphy, climate and environmental reconstruction.

No faunal remains were identified at the site.

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Whitlingham held in UK institutions. These are shown in table 3.31. Roe was unable to obtain accurate figures for artefact numbers.

Table 3.31. Whitlingham Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	**Handaxes (including roughouts)**	**Cores and flakes**	**Levallois cores and flakes**
Whitlingham (general)	About 200	Unknown	0?
TOTAL	About 200	Unknown	0?

The implements were found in a narrow gravel band beneath sands and clays (Sainty & Boswell 1926). Some of the handaxes from Whitlingham were recovered from spoil, both by pit workers (who were motivated 'by a system of rewards') but at least 185 artefacts were recorded *in situ* by Sainty and Halls themselves (Sainty & Boswell 1926). The overall condition and volume of debitage recovered led Sainty to interpret Whitlingham as a manufacturing site, an interpretation reiterated by Roe (1981), although none of the flakes were found to be refitting. Sainty & Boswell (1926) recorded that an unusually large number of the Whitlingham handaxes were produced on flakes (39%) compared to those produced 'from cores' (32%), the remainder being fully worked and therefore not classifiable, although Sainty suggested that "the majority of these were really flake implements also”. He also identified ‘a number of cases’ where the bulbar (proximal) end of the flake had been reduced into the tip of the handaxe, which he referred to as ‘reversed’ flakes (Sainty & Boswell 1926). Sainty & Boswell (1926) noted that their initial finds were remarkably large, whilst later finds tended to be smaller: the Palaeolithic yield of the pit also decreased over time. This points to an uneven distribution of tools across the site, perhaps both in terms of numbers and characteristics. Whitlingham was assigned to Roe’s (1968) morphometric group I. He recorded tranchet removals on 25% of the measured handaxes, the highest proportion of any Group I site. This certainly suggests that the number of typological cleavers exceeded the proportion of metrical cleavers (4.9%) measured in Roe’s study. This is broadly confirmed by Wymer’s (1985) typological analysis, which recorded around 9.5% of the Whitlingham sample as a cleaver (shown in figure 3.38), a proportion nevertheless lower than the nearby site of Keswick. He also noted the overwhelmingly fresh condition of the Whitlingham handaxes, again supporting the interpretation of the site as being *in-situ* or almost *in-situ*.

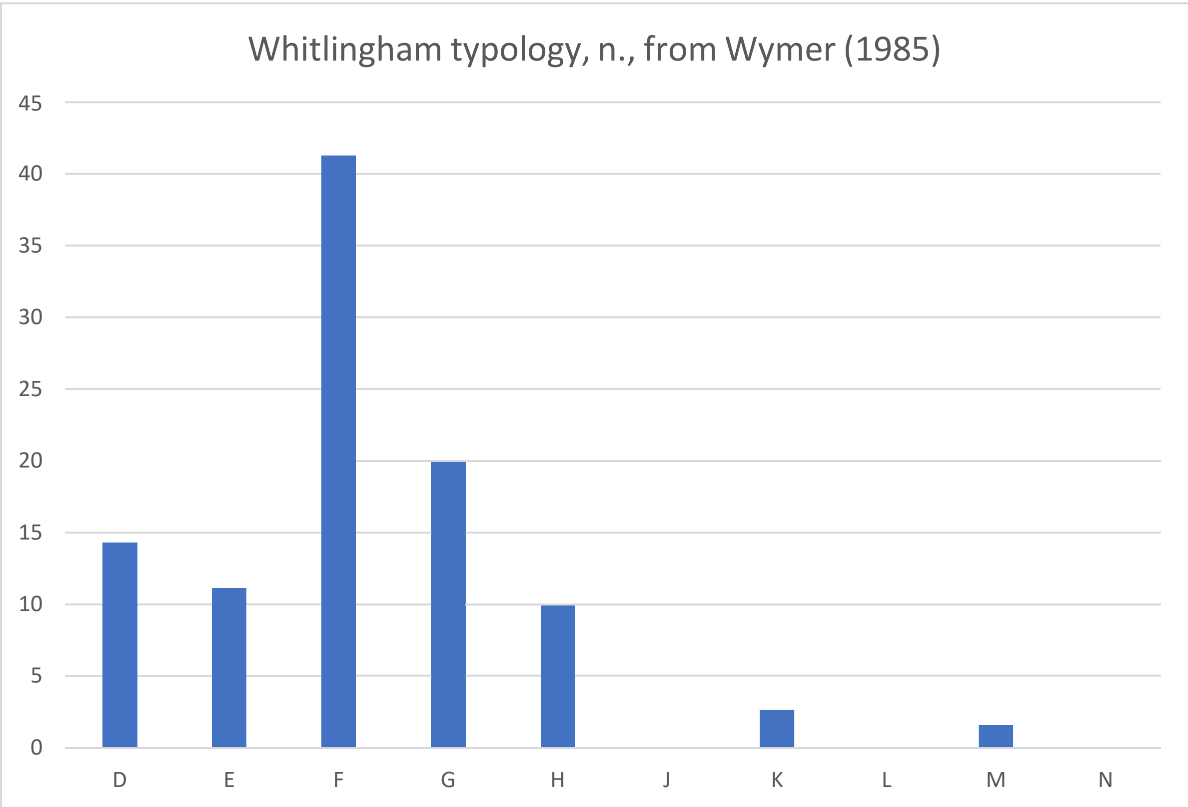


Figure 3.38. Whitlingham handaxe typology, from Wymer (1985).

White & Foulds (2018) regarded the relatively high symmetry of the Whitlingham handaxes, to be the result of ‘advantageous use of natural symmetry’, a consequence of the use of natural flakes (White & Foulds 2016). Of the 16 Whitlingham cleavers in Cranshaw’s (1983) study, 9 (56%) were found to be made on flakes (mostly side-struck). She also noted that the cleavers from Whitlingham were significantly smaller than the other major sites in her study (Furze Platt, Baker's Farm) and even than nearby Keswick, leading her to suggest that they were less 'heavy duty' and perhaps produced for a different function.

Sample.

Regrettably, the main collections of Whitlingham handaxes at the Norwich Castle Museum were inaccessible; metrical data was culled from Roe (1968a), Wymer (1985) and White (1996), allowing this important site to be partially integrated into the present research.

3.8.2. KESWICK, Norfolk. (Mill Gravel Pit: TG 214 051).

Site History.

Palaeoliths were collected by Mr G.D. Lawrence from the Mill Gravel Pit between 1956 and 1970, following which the pit closed (Roe 1968a; 1968b). The pit was already filled in and inaccessible when John Wymer visited in 1971 (Wymer 1985). Baden-Powell & West (1960) provided one of the very few primary accounts of the site. Roe (1981) described Keswick as being 'virtually unpublished', an observation also made by Cranshaw (1983) in her study on handaxes and cleavers.

Geology and Stratigraphy.

There are no published geological descriptions of the site nor of the circumstances of collection. Wymer (1985) speculated that there was gravel 'almost up to the 15m contour'. He observed chalk bedrock in a nearby pit, where it was overlaid by a breccia of chalk rubble, sand and clay to a depth of around 1.5m. A section in the Geological Survey Memoir (Woodward 1881) shows sediments banked up against a steep chalk cliff (c.f. Purfleet).

Terrace stratigraphy.

The situation of the Keswick site, along with Whitlingham, on the '50-foot' terrace of the Yare is loosely suggestive of an MIS 10 – 9 – 8 age based on terraces at similar altitude in other river systems (e.g., Roe 1968a). However, this should be treated cautiously as the ages of the Yare terraces are poorly constrained and its staircase is not clearly defined (Westaway 2009; Holmes et al., 2018). White et al. (2018) noted the implied MIS 9 – 8 age of Keswick based on the presence of Levallois technology, but they considered this attribution to be 'unsatisfactory', possibly based on the lack of supporting vertical provenance or stratigraphic evidence.

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Keswick held in UK institutions. These are shown in table 3.32.

Table 3.32. Keswick Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Keswick (Mill Gravel Pit)	182	99	3
TOTAL	182	99	3

Wymer (1985) provided a basic typological summary of the site based primarily on the collections of Norwich Castle Museum, shown below in figure 3.39. Whilst pointed types were the most common, Wymer recorded 26.6% of his sample as a typological cleaver. This is a remarkably high proportion, even compared to other famously cleaver-rich assemblages (e.g., in Wymer 1968, 1985; Cranshaw 1983).

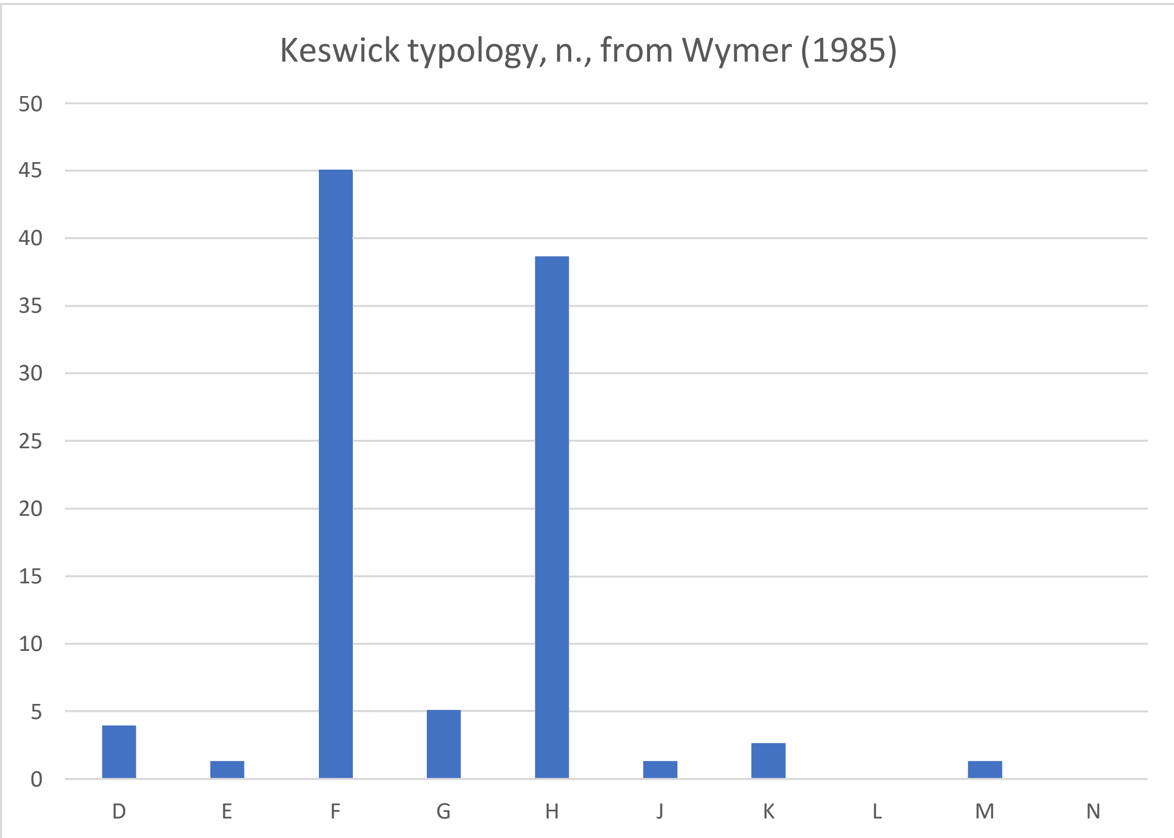


Figure 3.39. Keswick handaxe typology, from Wymer (1985).

Sample.

As with Whitlingham, the large collection held in the Norwich Castle Museum was inaccessible for the duration of the current research, unfortunately limiting the sample size available. The 24 handaxes included in this study from the BM Newnham and Leighton collections have never been included in any published study of the site.

3.8.3. REDHILL, and THETFORD (N.F.P), Norfolk. (Redhill: TL 862 842).

Site History.

Most objects marked 'Thetford' with no fixed provenance probably originated from Redhill (Wymer 1985, 1999). Early accounts of Redhill were given by Flowers (1867, 1869) and Prigg (1869), the latter noting that the pit was archaeologically productive over a relatively short period of time. The site was mentioned again by Evans (1897) but had ceased being commercially worked by the end of the 19th century. The site remained exposed until at least 1934 when Paterson studied it as part of his thesis on the Pleistocene geology of the region (Paterson 1945) but had become obscured by the time Wymer visited in the early 1980s (Wymer 1985; Gibbard et al., 2008).

Geology and Stratigraphy.

The gravels at Redhill were 3.5 – 5m thick and were described as coarse, with a red sandy matrix (Evans 1897; Wymer 1985). Larger flint clasts were found towards the base of the gravel along with most of the palaeoliths (Evans 1897), although earlier work by Prigg (1869) suggested they mostly came from higher in the gravel. A borehole survey presented in Gibbard et al. (2008) suggested that nearby, comparable terrace deposits featured basal gravel deposits emplaced by a braided stream, alternating with colluvial sediments higher in the sequence and capped with what were presumed to be aeolian and colluvial deposits (Gibbard et al. 2008).

Terrace stratigraphy.

Extensive borehole surveys in the area suggested that the 'Redhill terrace' deposits have an extensive spread, with the same sediments occurring over 2.4km to the east near Thetford and 1.25km to the north (Paterson 1942; Gibbard et al. 2008; Wymer 1985). Elephant, horse, bison and deer bones were found in the Redhill sediments (Prigg 1869; Evans 1897). These species are consistent with an MIS 10 – 9 – 8 age attribution based on comparison to Lynch Hill terrace species (Gibbard 1985, 1994). A diverse but stratigraphically unprovenanced molluscan fauna was also recorded (Paterson 1942; Gibbard et al. 2008). Gibbard et al. (2008) suggested an MIS 10 – 8 age for this terrace based on its altitude, fossil content, and archaeology.

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Thetford held in UK institutions. These are shown in table 3.33.

Table 3.33. Thetford Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Thetford (general)	97+	11	0
Thetford (other named locality)	10	4	0
Thetford (Red Hill)	70	17	0
TOTAL	177+	32	0

Wymer (1985) provided the most thorough overview of the archaeology from Redhill. He described a typologically mixed assemblage which was nevertheless dominated by pointed and sub-cordate forms (shown in figure 3.40 below). Ovates, cordates, ficrons and cleavers occurred in low numbers.

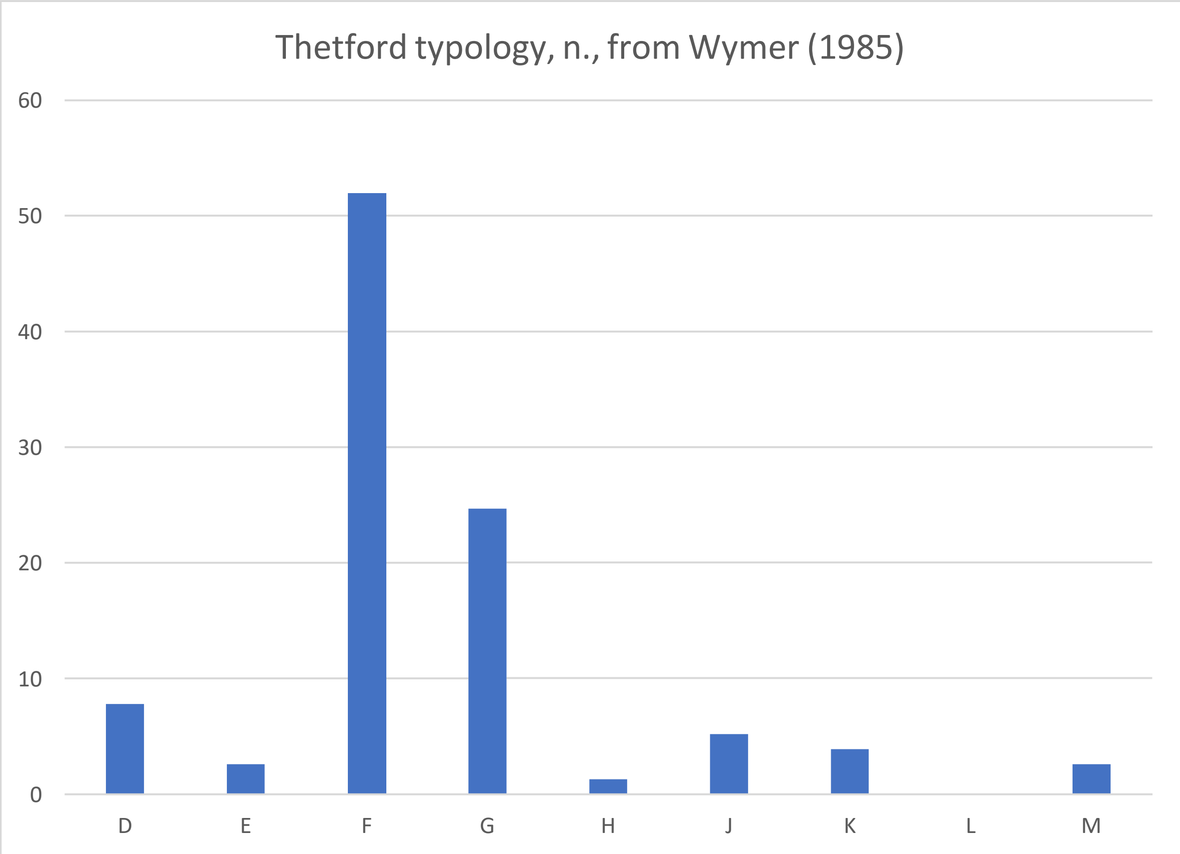


Figure 3.40. Thetford handaxe typology, from Wymer (1985).

Wymer considered both the archaeology and geology at Redhill to be remarkably similar to nearby Broomhill (only around 7km away). A single 'questionable' Levallois flake was found but lacked a secure provenance (Gibbard et al., 2008). Roe included Redhill in a list of mixed but clearly point dominated assemblages which had neither been sorted into groups nor showed a clear affinity for any one group.

Sample.

A total of 63 handaxes were assessed, principally from the PRM (unknown collection, n=38) and BM (various collections, n=25).

3.8.4. BARNHAM HEATH, Norfolk. (TL 887 797)

Site History.

This 'site' covers a large area and is sometimes referred to as Barnham Common or County Hole. The site is also provenanced as 'Barnham' in some museum records but is distinct from the more thoroughly investigated Barnham East Farm site, which is thought to be older (Ashton et al., 2006, 2016; Ashton 2018). The archaeology from Barnham Heath was collected from as early as 1913, followed by a period of occasional quarrying until 1947, when more intensive commercial working of the quarry up to 1955 produced most of the current assemblage (Wymer 1985). Collection was made by quarrymen trained to identify palaeoliths, and by Basil Brown (an associate of Ipswich Museum and excavator of Sutton Hoo) (Wymer 1985). Brown produced notes and reports on his visits to the site, but Barnham Heath has never been formally excavated.

Geology and Stratigraphy.

Basil Brown produced a geological section which showed 5.8m of fluviatile sandy gravel over a disturbed chalk bedrock (in Wymer 1985).

Terrace stratigraphy.

Barnham Heath is situated to the south of the Little Ouse, on a terrace 6-8m above the current floodplain (Wymer 1985). The site post-dates the obliteration of the Bytham in the Anglian (MIS 12) glaciation, and is associated with the modern Little Ouse, meaning the deposits must be post-Anglian (figure 3.41). Basil Brown's notes suggest that the artefacts came from the highest of the local Little Ouse terraces; a recent campaign of electron spin resonance (ESR) dating of the local Little Ouse terraces suggests that the highest terrace dates to MIS 10 – 8, albeit with a relatively high degree of uncertainty (R. Davis *pers. comm*. 26.10.2021).

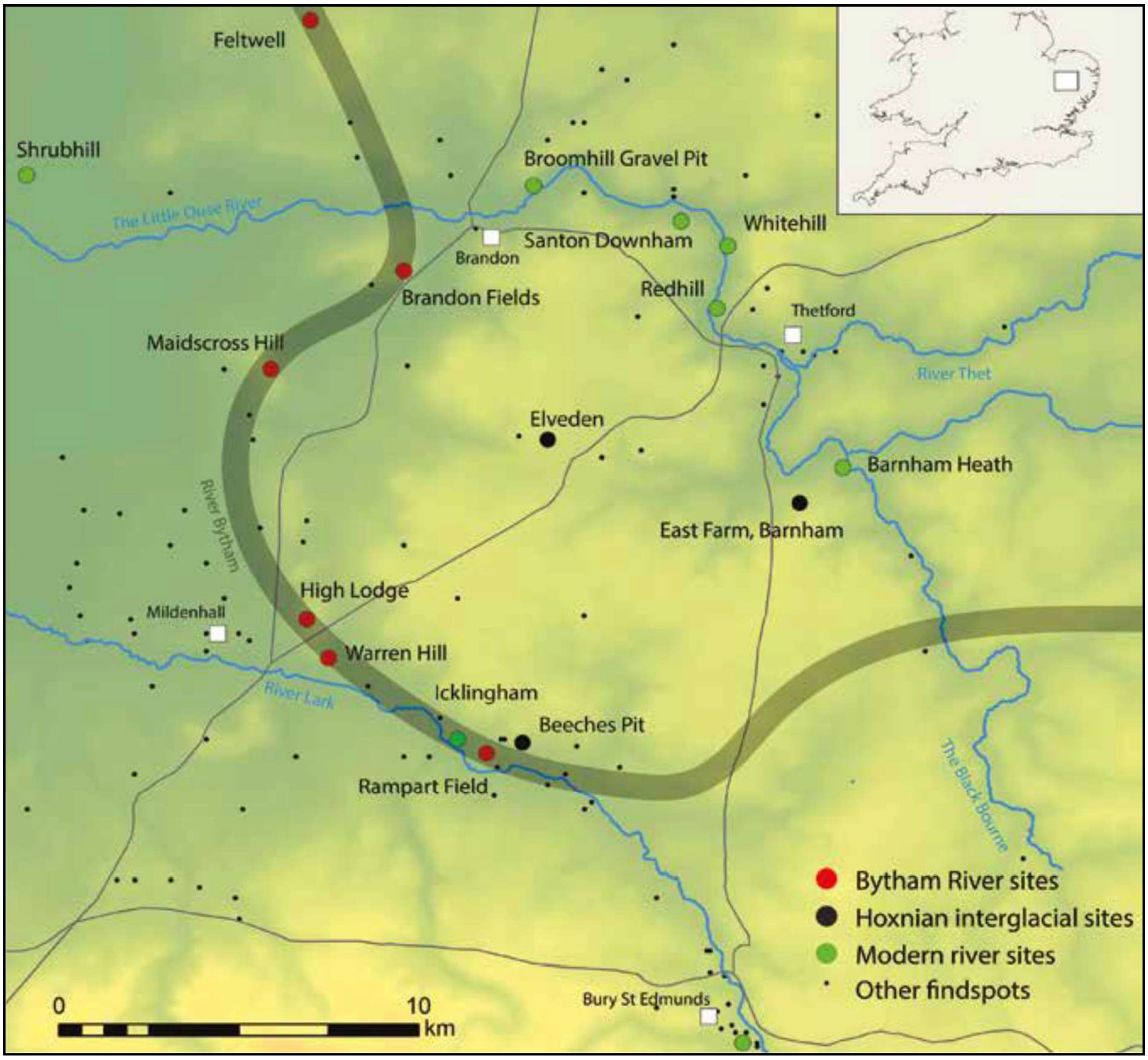


Figure 3.41. A map of the Brecklands region, showing relative site ages. From Davies et al. (2017, 29) with site locations taken from The English Rivers Palaeolithic Survey (Wessex Archaeology, 1996).

Barnham Heath sits on a terrace at a lower altitude than the nearby lacustrine sites at Barnham East Farm and Elveden, both considered to be Hoxnian (MIS 11) sites based on recent investigations (Ashton et al. 2005, 2016) (see figure 3.42).

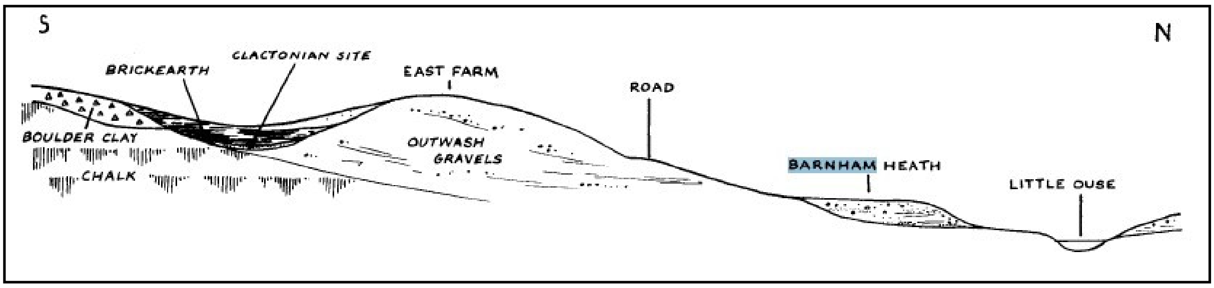


Figure 3.42. An idealised transect of the valley of the Little Ouse, from Wymer (1985, 123, fig. 42) based on Baden-Powell (1939).

The presence of proto-Levallois material (see below) in association with handaxes further argues for an MIS 9 attribution, although the rolled, mixed and derived nature of the assemblage suggests that this evidence should be treated with some caution.

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Barnham Heath held in UK institutions. These are shown in table 3.34.

Table 3.34. Barnham Heath Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	**Handaxes (including roughouts)**	**Cores and flakes**	**Levallois cores and flakes**
Barnham Heath	244+	++	At least 8
Total	244+	Many	At least 8

Artefacts were recovered from a depth of 4.88 – 6.10m. Most of the artefacts originated from the south and southeast faces of the pit (Brown, n.d.). The implementiferous deposits had largely been removed by quarrying by the time Wymer assessed the site in the 1980s and the remaining exposed faces had degraded (Wymer 1985). Wymer (1985) mentioned that the ‘derived industries’ found in the lower levels at Barnham Heath may represent reworked higher-terrace (MIS 11?) artefacts, although as the assemblage at Barnham East Farm is overwhelmingly core-and-flake, this observation may not apply to the Barnham Heath handaxes. Wymer (1985) noted the high frequency of pointed, sub-cordate and crude handaxes, in addition to proto-handaxes (type C). Large and massive flakes in rolled condition (possibly derived older material).

Barnham Heath had the largest number of Levallois flakes and cores of any of the Brecklands sites, although the relationship between them and the Acheulean component is unclear due to differences in condition and therefore less useful for dating (Davis et al. 2017; Rawlinson 2021). The situation is confused by the fact that several gravel pits were in operation in the area of Barnham Heath, situated on multiple Little Ouse terraces. It is therefore possible that the Levallois material originated from a lower terrace of a younger age (Ashton & Scott 2015). However, Wymer (1985) stressed that the prepared core technology is *proto*-Levallois, which would be more consistent with a late MIS 9 age and might suggest that it originated from the same terrace as the Acheulean component.

Sample.

A total of 83 Barnham Heath handaxes were assessed, mostly from the Ipswich Museum collection (n=47) and PRM (unknown collection, n=36).

3.9. The Solent.

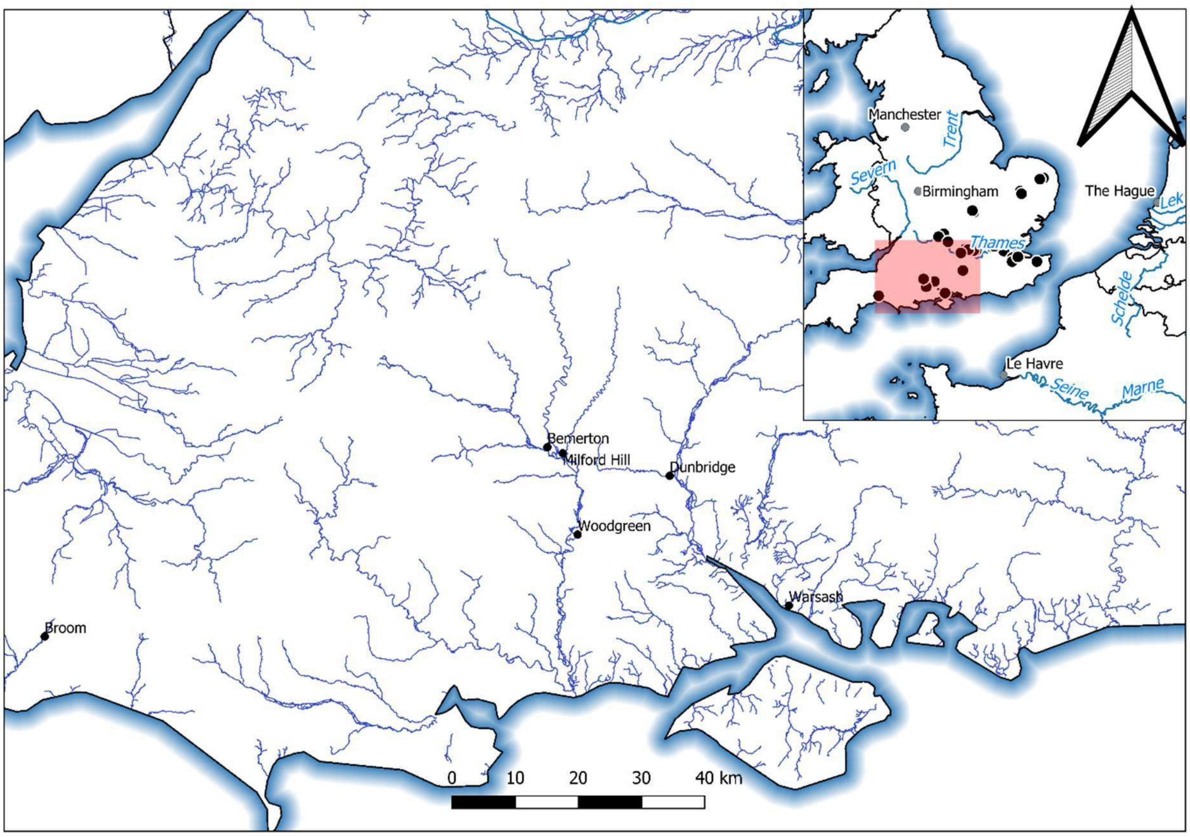


Figure 3.43. Solent map.

3.9.1. WARSASH, Hampshire. (NFP, SU 505 053).

Site History.

Handaxes were collected from Test terrace gravels exposed at the shore of Southampton Water in the late 19th century, having been eroded out of Hamble Terrace gravels in the river cliffs between Warsash and Brown Down (Evans 1872; Davis et al. 2016). Commercial gravel extraction from several pits in the Warsash area from the 1920s to the 1970s yielded sizable collections of Lower Palaeolithic artefacts. Several collectors operated in the Warsash pits, most notably C.J. Mogridge of Winchester Museum who was active between the 1920s and 1950s at Dyke's Pit, New Pit, Park's Pit and Newbury's Pit (Davis et al. 2016).

Geology and Stratigraphy.

Burkitt et al. (1939) described an approximately 3.5m sequence of sands and gravels over Barton Sand bedrock, the lower part of which was the source of the Acheulean material, at Newbury's Pit. The sequence was capped by a 'buff, stony loam'. Shackley (1978) identified a preserved gravel bar within a similar fine-grained sediment at the nearby Fleet End Pit, Warsash. This bar, and the loam, were the source of Levallois artefacts. Hatch et al. (2017) provided further descriptions of the Warsash sediments at two exposures of the Mottisfont/ Lower Warsash terrace; at both locations they observed gravelly and sandy bedforms, tentatively interpreted as stacked gravel bars.

Terrace chronology and stratigraphy.

Davis et al. (2016) used historical map regression to establish that all four pits visited by Mogridge prior to 1939 exploited Lower Warsash terrace gravels, as indeed did all the local gravel pits up until 1945. After that date, pits were opened into the Hamble terrace. In common with other Solent region sites, no organic material was preserved. In the absence of biostratigraphic correlation, rigorously tested thermoluminescence dates were produced by Hatch et al., (2017), suggesting that the Lower Warsash terrace had aggraded in MIS 8 and the Hamble terrace in MIS 7, although they pointed to the need for further studies to confirm these dates. If the dates are accepted, then the archaeology within the Lower Warsash terrace must pre-date or be contemporary to the formation of the terrace in MIS 8, and potentially includes handaxes produced during MIS 9. The Lower Warsash terrace may therefore be correlated to the upstream Mottisfont terrace, based on comparable OSL dates which point to an MIS 9 – 8 range (Harding et al., 2012).

2.1.4. Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Warsash held in UK institutions. These are shown in table 3.35.

Table 3.35. Warsash Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	**Handaxes (including roughouts)**	**Cores and flakes**	**Levallois cores and flakes**
Warsash (general)	376	58	11
Warsash (Fleet End)	13	1	11
Warsash (New Pit)	16	2	0
Warsash (other)	10	0	0
TOTAL	415	61	22

Artefact collections from Warsash generally lack geographical provenances and almost always lack stratigraphic provenances. Burkitt et al., (1939) suggested that three discrete groups of handaxes with differing taphonomy, typology and technology were present in the Warsash deposits, along with a Levallois industry. Davis et al., (2016) identified only two distinct taphonomic groups, a typologically heterogeneous group probably corresponding to Burkitt and colleague's 'Early' and 'Middle Acheulean' groups (1) and the other to the 'Late Acheulean' group (2). Davis et al.'s Group 1 was predominantly in abraded condition with high degrees of patination, suggestive of protracted movement in a fluvial environment. The Group 1 handaxes were typically smaller than the less rolled material and included ovate and cordate types alongside points. Their Group 2 showed less severe abrasion and the typological makeup of the group was more uniform, predominantly consisting of pointed and sub-cordate types. They also noted that handaxes of Group 2 had higher reduction intensity, somewhat at odds with what might be expected of a point-dominated assemblage and perhaps reflecting a local knapping tradition. They suggested that both of their handaxe groups may have derived from MIS 9 deposits reworked into the Lower Warsash terrace gravels in MIS 8, with the more abraded handaxes having undergone a greater degree of fluvial transportation (perhaps from multiple upstream sites), and the less abraded examples a lower degree of fluvial transportation (perhaps even a single, local source). Alternatively, they suggest that their Group 2 might represent broadly contemporary manufacture and deposition in MIS 8, consistent with the purported late survival of Acheulean populations in Britain (c.f. Harnham, Bates et al. 2014).

The presence of handaxes with pronounced plano-convexity in profile has also been widely noted (Burkitt et al. 1939; Shackley 1978), prompting comparisons with Wolvercote (Roe 1981; Davis et al. 2016). Roe (1981) compared the unifacial plano-convex Warsash handaxes to similar examples ('*Halbkeile'*) of the German Micoquian tradition (c.f., Bosinski 1968), although he cautioned against the uncritical acceptance of Burkitt et al.'s (1939) suggestion that the plano-convex handaxes represented a distinct 'Micoquian' industry which post-dated the other Acheulean industries at Warsash.

The Levallois component of the Warsash assemblage was found to be markedly different in condition to the handaxes, pointing to a different taphonomic history and potentially a different stratigraphic origin (Davis et al. 2016; Rawlinson 2021). The chronological relationship between the handaxe and Levallois technology of the Warsash archaeological assemblage is unclear. The condition of the Levallois artefacts could indicate deposition in a fine-grained sediment within the terrace sediments, in which case millennial scale contemporaneity with the handaxes might be assumed, or else deposited on the terrace surface, in which case they would post-date the handaxes (Davis et al. 2016).

Sample.

A total of 156 Warsash handaxes were assessed, principally from the BM (Modridge and other collections, n=131) and AA (unknown collections).

3.9.2. DUNBRIDGE, Hampshire. (SU 319 261).

Site History.

Handaxes were found in gravel pits at Dunbridge from the late 19th century until 1945. It was the most prolific Lower Palaeolithic site in Hampshire (Roe 1968a; 1981; Hosfield & Chambers 2004). Early reports of Dunbridge were provided by W. Dale (1912, 1918), a Southampton based antiquarian who built most of the extant artefact collections, and by the geologist H.J.O. White (1912). Gravel extraction immediately to the south of the original Dunbridge pit necessitated a developer-funded systematic archaeological and geological watching brief (1991 – 2007), which provided a wealth of contextual data for the artefact collections (Collcutt et al., 1988; Bridgland & Harding 1993b; Harding et al., 2012; Harding & Bridgland 2014).

Geology and Stratigraphy.

Dale (1912) identified three divisions within the terrace gravel deposits: a dark red lower gravel containing rolled handaxes, a yellowish middle gravel, and an upper white gravel containing fresh handaxes. He later interpreted the white gravel as originating from a different period of deposition (Dale 1918), although the more recent watching-brief investigations found that the pronounced colour change was the result of chemical leaching of the uppermost part of the gravel by groundwater and therefore a weathering feature rather than a genuine sedimentary structure (Wessex Archaeology 1992; Harding et al., 2012). The same watching-brief investigations found that the terrace deposits at the Dunbridge Quarry were primarily composed of Belbin Gravel, a well-bedded water-lain gravel which degraded towards the top due to cryoturbation. The Belbin gravel was deposited onto an undulating Palaeogene bedrock surface and reached a thickness of 4 – 5m (Bridgland & Harding 1993b; Harding et al., 2012; Harding & Bridgland 2014).

Terrace stratigraphy.

The earliest observations of Dale (1912, 1918) and White (1912) noted that two distinct terrace levels were present in the Dunbridge area. They termed the upper gravels on which the original

Dunbridge pit was situated the ‘Belbin Stage’. The lower gravels, quarried at nearby Kimbridge, were termed the ‘Mottisfont Stage’. These observations were confirmed by later investigations, with the upper and lower levels renamed as the Belbin terrace and Mottisfont terrace respectively (Collcutt et al., 1988; Bridgland & Harding 1993b).

The Test terraces have been the subject of a series of studies utilising geochronological methods to provide absolute dates for the terrace sediments. These methods are particularly valuable in a region where poor organic preservation generally precludes the biostratigraphic correlations which have been employed elsewhere. The dates produced have in turn been used to project long-profile terrace correlations, which are particularly relevant here for relating Dunbridge to the downstream site at Warsash (see above). The Belbin terrace was modelled as having aggraded in MIS 10 (Westaway et al., 2006; Bates & Briant 2009), later refined to MIS 9b based on the first appearance of ‘proto-Levallois’ archaeology (see below; Harding et al., 2012; Harding & Bridgland 2014). This terrace was correlated with the Upper Warsash terrace downstream (Hatch et al., 2017). The Mottisfont terrace was dated by OSL to MIS 8 -7 and correlated to the Lower Warsash terrace downstream (Harding et al., 2012; Hatch et al., 2017).

Archaeology review.

Roe (1968b) provided an account of the numbers of artefacts from Dunbridge held in UK institutions. These are shown in table 3.36.

Table 3.36. Dunbridge Lower Palaeolithic archaeological inventory (Roe 1968b).

Locality	Handaxes (including roughouts)	Cores and flakes	Levallois cores and flakes
Dunbridge (general)	967	43	3
Dunbridge (other)	3	0	0
TOTAL	970	43	3

Despite the bleached upper gravel having been found to be a purely chemical feature, Bridgland and Harding concurred with the earlier observations of Dale (1912; 1918) that the material towards the top of the gravel was in fresher condition than that from the darker gravels toward the base, and that the Belbin gravel was the more archaeologically productive deposit (Harding et al. 2012; Harding & Bridgland 2014). Perhaps the most significant discovery of the ALSF funded watching brief was the identification of three proto-Levallois cores in a rolled and stained condition, thought to have originated from the Belbin gravel, along with three fully-developed Levallois cores in fresh condition. These industries may have chronological significance. The first occurrence of fully-developed Levallois technology in the Solent region has been used to 'anchor' terrace ages to MIS 8, and the occurrence of proto-Levallois may indicate an MIS 9b age through cautious comparison with similar technologies found at Purfleet, Essex (Westaway et al. 2006; Bridgland et al. 2012). Dunbridge was not included in Roe's seminal morphometric study, for lack of what he described as a 'reliable sample' (Roe 1968a), later describing it as a mixed but point-dominated assemblage for which a robust group application could not be made (Roe 1981).

Sample.

A total of 103 handaxes were analysed in this study from the collections of the CAA (n=101) and the ROM (n=2). The former consists of the E.A. Lawrence collection (n=81), Cambridge Antiquarian Society collection (n=12), Whitcombe Green collection (n=1), Henry Sandon collection (n=1), and 6 from unidentified collections.

3.9.3. MILFORD HILL, Wiltshire (SU 150 299).

Site history.

Collection of artefacts from Milford Hill took place in the late 19th and early 20th centuries from pits, cellars and roadside exposures (Blackmore 1864, 1865, 1867; Read 1885).

Geology and stratigraphy.

The deposits in the area include a flint gravel containing large, unrolled flint nodules which resembled the deposits at nearby Bemerton (see below; Blackmore 1864; Egberts 2016). The flint gravel was overlaid by loose, white fossiliferous gravels and sands, then by dark red clays and gravels from which most of the implements were derived (Blackmore 1867). In a watching brief at Milford Hill, Harding & Bridgland (1998) noted that the basal flinty gravel was disturbed and the contact between the gravel and the chalk bedrock was irregular, indicating solution processes in both strata. They interpreted chalky inclusions within the flinty gravel deposits as 'coombe rock' derived from the ancient valley sides, suggesting that the deposits at Milford Hill represented a fast-flowing river which incorporated slope-deposited chalk from the valley sides. This may in turn have introduced artefacts into the fluvial sediments (Harding & Bridgland 1998).

Terrace stratigraphy.

The site was situated on undifferentiated terrace deposits (Egberts et al. 2019). The similarity in height above O.D. of the river terrace gravels at Milford Hill and those at Harnham are suggestive of broadly contemporaneous deposition (i.e., ~250 kya., Harding & Bridgland 1993; Bates et al., 2014; Egberts 2016; Egberts et al., 2020), although whether altitudinal correlation permits sub-stage or only millennial scale contemporaneity to be suggested (i.e., MIS 10 - 8) is less clear. Even if the late dates produced are accepted, it is unclear whether the artefacts and the deposits in which they were found are penecontemporaneous; the possibility of reworking cannot be discounted (Pettitt & White 2012).

Archaeology review.

Egberts (2016) provided the first detailed study of the artefact assemblage. The Milford Hill handaxes were overwhelmingly made on nodular or cobble blanks rather than flakes and had been intensively worked. Most of the artefacts were found to be in rolled or slightly rolled condition, suggesting post-depositional fluvial transportation. Two possible Levallois flakes were identified at Milford Hill although these were not identified in Roe's Gazetteer (Roe 1968b; Egberts 2016).

Sample.

Tripartite diagrams from Egberts (2016) are used to provide comparative morphometric data for 346 Milford Hill handaxes.

3.9.4. WOODGREEN, Wiltshire (SU 172 170).

Site history.

Westlake made the first collection of artefacts from Woodgreen in the 1870s and 1880s (Westlake 1889). Section cleaning was carried out in 1986 (Bridgland & Harding 1987).

Geology and stratigraphy.

The local geology consisted of 2.5 – 3m of cross-bedded, poorly sorted medium- coarse matrix supported flint gravel overlying the fine sands and clays of the underlying Bagshot formation. (Bridgland & Harding 1987).

Terrace stratigraphy.

Woodgreen is situated on terrace 7 (A7) of the Avon at up to 67m O.D. (BGS 2004; Egberts 2016). Sediments of the A7 terrace at Woodgreen were directly dated by OSL to 310 – 350 kya. corresponding to MIS 10 – 9 (Egberts 2016; Egberts et al. 2020).

Archaeology review.

Roe (1968b) recorded 409 handaxes from the site, making it the largest site in the palaeo-Solent region and one of the 'super-sites' of Britain (Brown et al. 2013). As with Bemerton and Milford Hill, most artefacts were found to be in rolled or slightly rolled condition; most were made on nodules rather than flakes (Egberts 2016).

Sample.

Tripartite diagrams from Egberts (2016) are used to provide comparative morphometric data for 389 Woodgreen handaxes.

3.9.5. BEMERTON, Wiltshire (SU 126 309).

Site history.

Collection of artefacts from Bemerton took place in the late 19th and early 20th centuries. Objects from Bemerton commonly have only a general provenance, but most probably came from a pit at Roman Road (Read 1885; Egberts 2016). The site was revisited by E. Egberts in 2014.

Geology and stratigraphy.

Egberts (2016) observed 4.58m of orange, poorly to moderately sorted clayey flint gravel overlying Newhaven Chalk bedrock and capped in places by brickearth. The character of the gravel suggested deposition by a braided river channel, succeeded by migrating gravel bars. Solution processes in the chalk bedrock probably caused some disturbance of the overlying fluvial gravels, resulting in limited post-depositional movement (and possibly abrasion) of the artefacts.

Terrace stratigraphy.

Bemerton is situated on an undifferentiated terrace at up to 77m O.D. (BGS 2005). Egberts et al. (2020) suggest a pre-MIS 10 age for these deposits based on a combination of OSL dating and altitudinal correlation.

Archaeology review.

Roe (1968b) recorded 75 handaxes from Bemerton, although 100 were included in Egbert's analysis. Egberts (2016) found the handaxes to be intensely worked, and mostly made on nodules rather than flake blanks. The artefacts are generally rolled or slightly rolled, the condition being closely comparable to the Milford Hill artefacts. The Bemerton assemblage included 5 'possible' Levallois flakes.

Sample.

Tripartite diagrams from Egberts (2016) are used to provide comparative morphometric data for 100 Bemerton handaxes.

3.9.6. BROOM, Dorset (Railway Pit: ST 326 020).

Site history.

The largest collections of objects from Broom were made by C.E. Bean in the 1930s, whose rigorous recording allowed reinvestigation of the site in 1978 – 82 and 2000 – 06 (Hosfield & Green 2013). Two main localities are significant: Pratt's Pits, upstream of the Axe-Blackwater confluence, and the Railway Pit downstream of the confluence. The site was comprehensively reassessed and published as a monograph by Hosfield & Green (2013).

Geology and stratigraphy.

The deposits at Broom aggraded over at least three periods. The basal Holditch Lane Gravel probably aggraded in cool conditions and is thought to be archaeologically sterile. This is overlaid by the bedded sands and silts (and occasionally, gravels) of the Wadbrook Member. The Wadbrook Member is interpreted as floodplain and channel deposits of the Axe and Blackwater rivers, with pollen taxa suggesting a post-temperate climate. The Wadbrook Member is thought to be the source of most of the Broom handaxes. The Wadbrook Member is in turn overlaid by the Fortfield Farm Gravel, thought to have formed in cold conditions and productive of a relatively few artefacts (Green et al., 2013).

Terrace stratigraphy.

Toms (2013) produced OSL ages of MIS 8 for the Fortfield Farm Gravel and MIS 9 ages for the Wadbrook Member at Broom, with Hosfield et al. (2013b) arguing that the bulk of the archaeology dates to a late, mild phase of MIS 9 based on palynological evidence.

Archaeology review.

Broom featured in Roe's (1968a) morphometric study, where it was sorted into his Group IV. A larger Broom assemblage was assessed by Hosfield et al. (2013a, 2013b, 2013c) who combined published data from the BM and Exeter Museum collections (Marshall et al. 2002; Hosfield & Chambers 2009) with newly measured data from the C.E. Bean collection. The typological analysis of Hosfield and colleagues is shown below in figure 3.44, showing an assemblage dominated by cordate-ovate types with points, cleavers and ficrons but almost no crude types (Hosfield et al., 2013b). Hosfield et al. (2013b, 2013c) recorded pronounced, and seemingly deliberately imposed, planform asymmetry in almost a quarter of the handaxe assemblage (an example of this is shown below in figure 3.45).

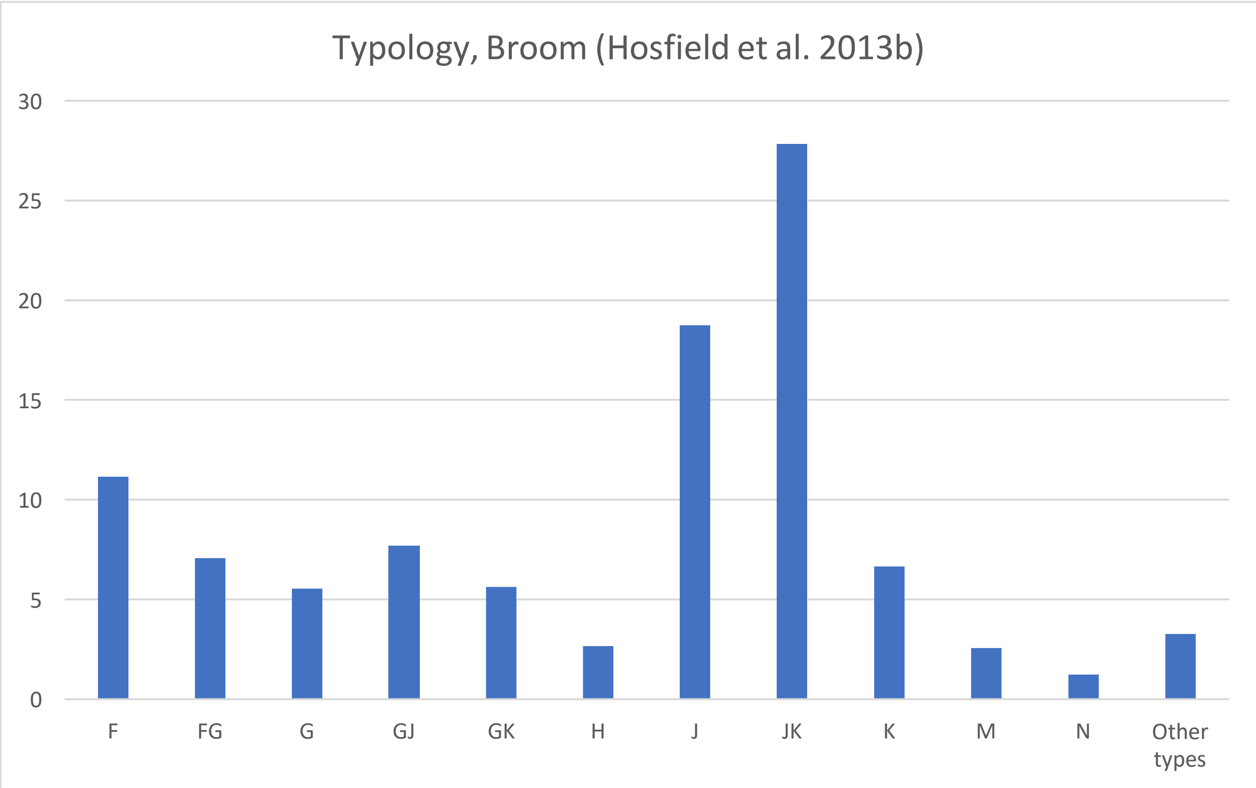


Figure 3.44 Broom handaxe typology, from Hosfield et al., (2013b).

Sample.

Five chert handaxes from Broom were found by the present author by chance in the collections of the National Museum of Scotland. These included two pointed handaxes (type F), two sub-cordates (type G), and a single cleaver (type H). One was distinctly lopsided, as shown above in figure 3.45. Five handaxes is far too small for meaningful analysis, so the following discussion will draw on data and interpretation from Hosfield et al., (2013b) who assessed 1230 Broom handaxes.

Figure 3.45. Five Broom handaxes held at the National Museum of Scotland. Of particular interest are the cleaver (lower left) and lopsided forms (left). All five were produced on chert, the most common raw material used at Broom (Hosfield et al., 2013b).

Chapter Four: Methodology.

4.1 Introduction.

The objective of this study is to shed light on key questions of Lower Palaeolithic cognition, society and culture by analysing handaxes from British MIS 9 sites. This chapter will outline the analytical techniques chosen to gather the data necessary to address these questions. The first section will consider the selection of artefacts for analysis and provide a brief outline of the data collection process. The chapter will then move on to outline the analytical methods applied to each handaxe; these are morphometrics, typology, technology, symmetry and taphomony. A brief justification for choosing each method will be given.

4.2. Object identification and data collection.

Handaxes were widely collected artefacts, in part because they are (by and large) easily identifiable to amateur collectors and gravel pit workers in a way which simpler cores and flakes were not. They were also generally more highly valued, and so were more widely collected. Happily, this has resulted in a wealth of measurable objects in museum collections.

The first phase of analysis involved the identification of handaxes in museums. Handaxes were identified according to the definitive features of the tool outlined in chapter two (in essence a cutting edge supported on a support produced through *façonnage*). In practise this was a simple process, as collections were almost always sorted by tool type. Handaxes had already been identified, first by collectors and then by curators, and the present author was able to quickly verify these identifications. Occasional issues arose when trying to discriminate certain 'transitional' tool types. In particular, it was not always clear at what point a convergent flake tool became a unifacial handaxe (a point also discussed by Rawlinson (2021), who noted a 'continuum' between flake tools and flake handaxes at several MIS 9 sites). An example of a dubious flake handaxe – incidentally, the only handaxe from Purfleet seen by the author – is shown in figure 4.1. Equally, it was almost impossible to distinguish between a large, crude and heavy handaxe (type D), a proto-handaxe or rough-out (type C), or a bifacially worked core. The strategy adopted for the present study was inclusive; if it looked like a handaxe, it was measured.

Figure 4.1. A handaxe-on-flake from Purfleet, Essex. This is an extreme example; the object could equally have been called a flake tool. The present study was generally inclusive of objects which had the overall appearance of a handaxe.

Where possible, the entire inventory of handaxes available in a museum from any given site was analysed. The reason for this was twofold; firstly, metrical averages and ranges (which are crucial for identifying morphological patterns) are more reliable when based on large samples. Secondly, it was observed that some museum collections tended to group objects of similar size or type in the same storage locations. This is presumably a relic of the arrangement of the collections as they were originally accessioned, often in the earlier part of the twentieth century. This grouping of like objects made selecting a representative sample extremely difficult, so all handaxes from a site were measured wherever possible. A table showing the per-centage of the sample measured, along with the main holding locations of the sample, is shown below in table 4.1.

Table 4.1. A table showing the proportion of handaxes included in the present study relative to the total inventory of handaxes from that site (based on Roe's Gazetteer, Roe 1968b).

Site	No. handaxes recorded (Roe 1968b)	No. of handaxes (this study, inc. broken)	Per-centage of total handaxe resource in this study.	Holding institutions.	Notes.
Baker's Farm	410	32	7.80	BM	
Barnham Heath	244	83	34.02	BM, PRM	
(Bemerton)	75	0 (100)	0 (100)	-	Data from Egberts (2016). The number measured exceeds the number recorded in Roe's Gazetteer.
Biddenham	320	119	37.19	BM, PRM	
(Broom)	1827	0 (1230)	0 (67.32)	NMS	Data from Hosfield et al., (2013b)
Canterbury West	25	17	68	HBSM	
Cookham	434	123	29.01	AA, ROM	
Cuxton	220	197	89.55	BM	
Dunbridge	970	103	10.62	AA, ROM	
Farnham C	-	27	-	BM	
Furze Platt	1950	529	27.13	BM, ROM	Includes handaxes held in the ROM, which do not feature in Roe (1968a).
Hillingdon L.B.	1491	107	7.18	BM, ROM	
Iver	287	139	48.43	BM	
Kempston	554	156	28.16	BM	
Keswick	182	25	13.74	BM	
Lent Rise	143	126	84.25	BM	
Leytonstone	96	75	78.13	BM, ROM	
Lower Clapton	179	51	28.49	BM	
(Milford Hill)	339	0 (346)	0 (100*)	-	Data from Egberts (2016). The number measured exceeds the number recorded in Roe's Gazetteer.
Ruscombe	179	110	61.45	ROM	Includes handaxes held in the ROM, which do not feature in Roe (1968a).
Stoke Newington	401	271	67.58	BM	
Thetford	177	63	35.59	BM, PRM	
Twydall	97	44	45.36	BM, AA	
Warsash	385	156	40.52	BM	
(Whitlingham)	200+	0 (117)	0 (~58.5)	-	Data from White (1996)
Wolvercote	75	41	54.67	PRM	
(Woodgreen)	416	0 (389)	(93.51)	-	Data from Egberts (2016)

4.3. Morphometrics

Measurements were taken from each handaxe according to Roe's (1968) methodology. Principal metrics were taken using an analogue calliper at the positions shown on figure 4.2.

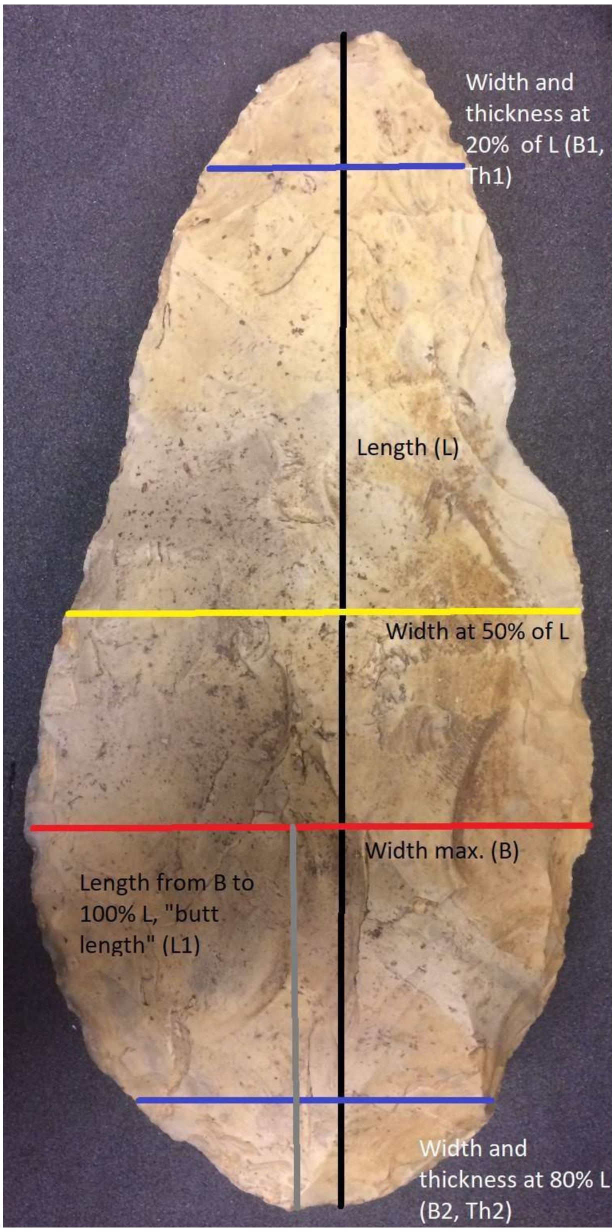


Figure 4.2. The principal metrical measurements, taken according to Roe (1968a).

These were in turn used to produce shape-descriptive indices, outlined in table 4.2.

Table 4.2. Principal metrics and indices obtained (Bordes 1961; Roe 1968; White 1998).

Metric	Index produced	Justification
Length (L, mm), the distance from tip to base of handaxe	**Elongation** (B/L)	Describes narrowness or broadness; used to produce tripartite diagrams.

aligned along the major axis of symmetry.	**Planform** (L1/L)	Describes metrical points (L1/L<0.35), ovates (L1/L=0.35 – 0.55) and cleavers (L1/L>0.55) according to Roe's (1968) methodology.
Maximum width (B, mm), the widest point measured in planform perpendicular to L.	**Refinement** (T/B)	Describes relative thickness, comparable to Bordes (1961) "Flatness". In the metrical sense, 'refinement' does not necessarily suggest high degrees of workmanship, although there is often overlap.
	(Elongation)	
Width at half length (XB, mm), the width measured in planform perpendicular to L at 0.5L. This metric was not recorded by Roe (1968a) but was part of Bordes' (1961) methodology.		
Thickness (T, mm), the maximum thickness perpendicular to the planform.	(Refinement)	
Mass (Wt, g), the mass of the object.		
Butt length (L1, mm), the distance from intersection of B and L to base of the handaxe along the major axis.	(Planform)	
Tip width (B1, mm), the width at 20% L.	**Tip shape** (B1/B2)	Describes the degree to which its edges deviate from parallel (i.e. how pronounced the convergence of edges is at the tip).
Butt width (B2, mm), the width at 80% L.	(Tip shape)	
Tip thickness (T1, mm), the thickness at 20% L.	**Cross-sectional uniformity** (T1/T2)	Describes the relative difference in thickness between the tip and the butt, which may be related to the overall refinement.
Butt thickness (T2, mm), the thickness at 80% L.	(Cross-sectional uniformity)	

The morphometric methodology of Derek Roe (1964, 1967 & 1968) is central to the current study. This method is summarised briefly here but outlined in detail in the results chapter as it was applied to the data collected for the present study. Roe used shape descriptive indices to 'sort' his handaxe assemblages, with hierarchical levels of sorting:

- Each handaxe was classed as either a point, ovate or cleaver based on the planform index (L1/L). These simple divisions are shown below in table 4.3 (illustrated in figure 4.3).

Table 4.3. Metrical planform shapes and their planform index ranges, following Roe (1968a).

Metrical shape.	**Planform range.**
Pointed	0 – 0.349
Ovate	0.350 – 0.549
Cleaver	0.550 – 1.0

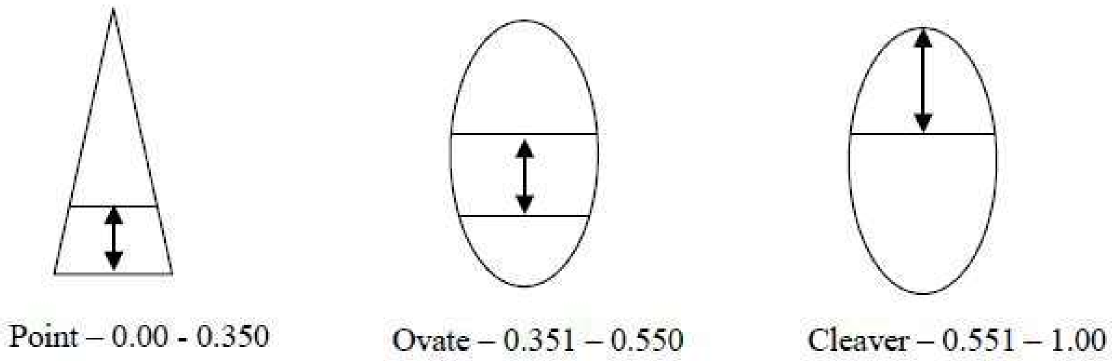


Figure 4.3. A schematic of Roe's planform shapes, from Emery (2010), fig. 3.5, p.70.

- Each site was then sorted according to the proportion of pointed, ovate and cleaver handaxes. Sites with >60% of handaxes of a planform shape (in practise, either pointed or ovate) was 'dominated' by that shape. Sites with >50% were '(shape) uncommitted'. Sites with less than 5% difference between pointed and ovate types were considered 'uncommitted'.
- Each site was then compared with other sites within its own category in terms of average elongation and tip shape; this allowed broadly similar groups of sites to be identified.
- Technological attributes (twisted profiles and tips, and *tranchet* removals) were then considered to corroborate and strengthen his metrical groups.

Unlike earlier and contemporary schemes which relied on essentially subjective typological designations (e.g., Breuil 1932a; Tixier 1956; Wymer 1968) or which focussed primarily or exclusively on African Lower Palaeolithic sites (e.g., Tixier 1956; Kleindienst 1962; Isaac 1969, 1977), Roe's methodology was both relatively objective (formulated from eight simple metrics and supplemented by three technological observations) and focussed entirely on Lower Palaeolithic sites from southern Britain. Unlike 3D GMM methods, which are often combined with complex statistical analyses in modern studies (e.g., Iovita & McPherron 2011; Grosman et al., 2011; Shipton & Clarkson 2015), the acquisition and interpretation of data using Roe's linear-measurements method is relatively straightforward and does not rely on specialised equipment – as Cranshaw (1983) remarked, 'the only skill required is the ability to measure accurately'. This naturally increases the volume of data which can be collected. There are, however, several limitations to Roe's methodology. His definitions of planform 'shapes' are essentially arbitrary. Whilst these divisions undoubtedly capture the shape of the *majority* of handaxes, there are exceptions: most notably, a typological cleaver may often register as an ovate should its widest point be around the middle, which is entirely possible (see White 2006; discussed further below). Likewise, crudity or irregularity at the butt might present an otherwise clearly pointed handaxe as an ovate – this may be the case with some of the extremely irregular forms made on burrow flints from Cuxton. The idea of 60% of an assemblage being either pointed or ovate representing 'dominance' is also arbitrary, although again it serves mostly as a useful first stage in sorting groups rather than a meaningful distinction – Stoke Newington, for example, was still confidently assigned to Group I despite not even coming close to being point-dominated (Roe 1968a). Roe's methodology relied on large sample sizes, and by his own admission the results become less meaningful with smaller assemblages. It is also the case, despite Cranshaw's assertion to the contrary, that intra-analyst variation can occur -particularly in the tricky L1 measurement (a difficulty noted by both White & Shaw (2003) and the present author). Nevertheless, Roe's methodology allows for the rapid, relatively accurate gathering of large quantities of data without the need for specialist equipment, which may be freely compared to other studies using the same measurements (e.g., Roe 1968a; Tyldesley 1986; Hosfield et al., 2013a; White 1998b; Egberts 2017). For this reason, Roe's methodology forms a crucial pillar of this study.

4.4. Typology

Wymer's (1968) typology (figure 4.4, below) was used to classify each handaxe. His typology was primarily based on observations of planform shape, combined with qualitative judgements of the relative 'refinement' of the object in the sense of its relative crudity or sophistication. Wymer's typology allows for a greater degree of variation to be expressed than purely morphometric schemes, giving the option of hybridising types which fall between categories (e.g., FG, an intermediate point/ sub-cordate). Nevertheless, Wymer's typology can suffer from inter-analyst variation and is insufficient on its own to fully describe idiosyncratic morphologies (Emery 2010). Here an attempt has been made to adhere to both the written descriptions and illustrated examples in Wymer's original work (Wymer 1968). Type EF (small crude/ pointed) has also been included, after Wymer (1985). In this work, a type M (true ficron) is any well-made handaxe with pronounced biconcavity, regardless of residual cortex at the butt; type FM refers both to examples with less pronounced biconcavity, and to examples where only one edge is concave in planform (this is discussed fully below).

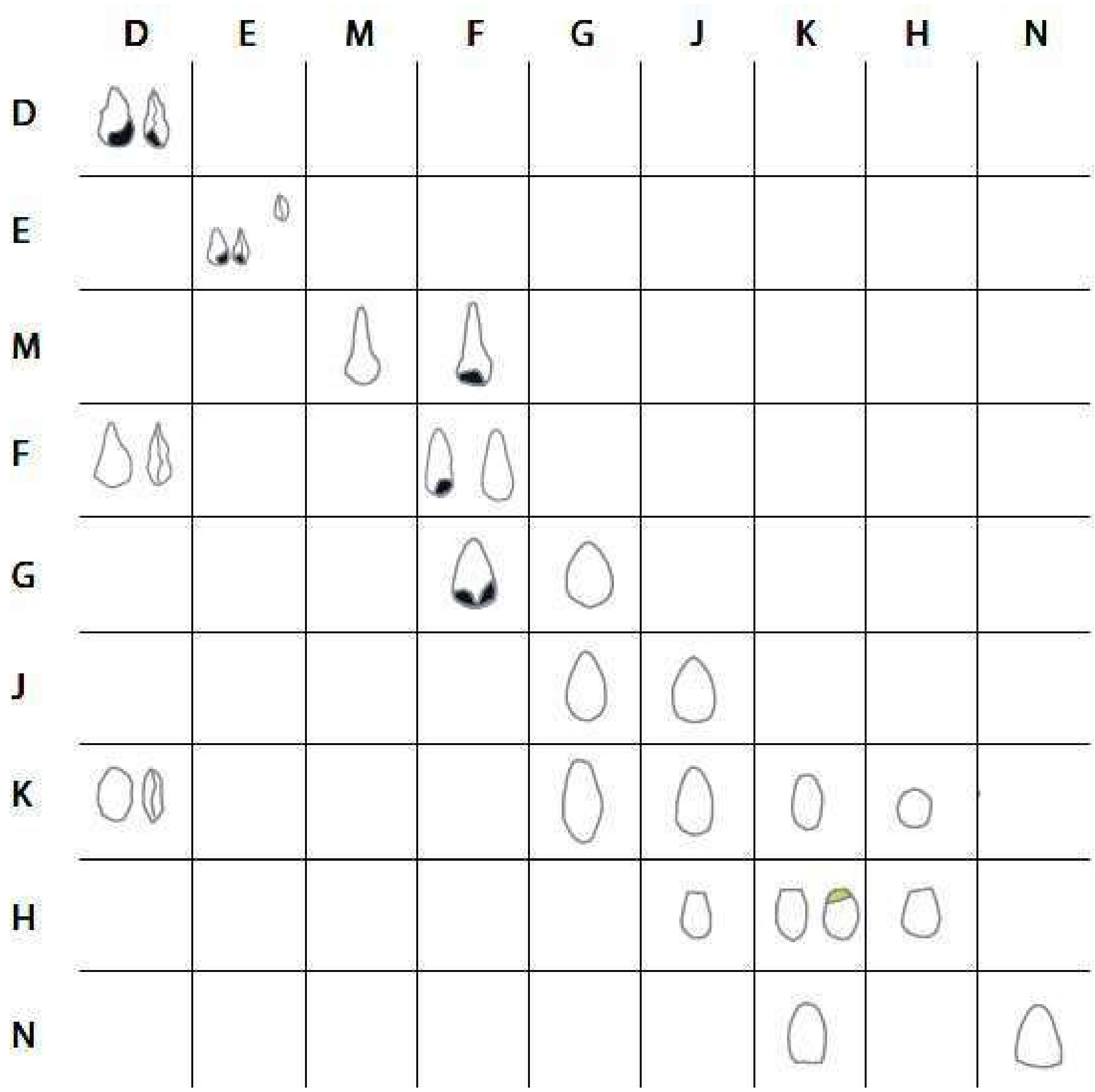


Figure 4.4. A schematic of Wymer's (1968) typology, rearranged by White (pers. comm.) to reflect the continuity between types.

The key types are described below in table 4.4, based on Wymer's original descriptions (Wymer 1968).

Table 4.4 Descriptions of Wymer's types (after Wymer (1968)).

Letter	Type	Description
D	Pointed handaxe (crude, large)	A crude, pointed handaxe worked exclusively with hard-hammer removals. Longer than an arbitrary length of 10cm and thick in section (Th is always at least 0.25*L). Wymer considered them a simple form of handaxe, 'not far removed from the rare proto-hand-axes (type C) of the Clactonian' and perhaps the product of abandoned rough-outs in the manufacturing of type F (pointed) handaxes, although he concedes that their sharp edges would have made them perfectly usable as tools.
E	Pointed handaxe (crude, small)	Broadly like type D, but with a length of less than 10cm. They tend to have greater refinement and are sometimes produced on flake

		blanks. Wymer noted that the small size of these handaxes makes the distinction between 'pointed' and 'ovate' slightly arbitrary; any small, crude handaxe is regarded as a type E.
F	Pointed handaxe	A heavy-butted but generally well-made pointed handaxe of broadly triangular shape, often finished with soft-hammer flaking. Wymer considered this type to be the 'characteristic product of the Acheulean Culture'. A large number of point and butt variations are noted.
G	Sub-cordate handaxe	A roughly lachrymiform handaxe which grades into wide-butted pointed types (F), distinguished from true cordates (J) by their heavy and generally unworked butts. *Tranchet* removals and twisting are generally rare.
H	Cleaver	A handaxe with a straight, wide transverse cutting edge at the tip. They are often heavy and irregular tools produced with little concern for 'anything beyond the production of a serviceable cutting edge', although a wide range of forms occur (expressed as the intermediate types HK and GH). *Tranchet* removals are often used to produce the eponymous transverse cutting edge.
J	Cordate handaxe	A refined handaxe with an all-round cutting edge, and a high degree of symmetry in a lachrymiform shape. These handaxes are produced or finished with soft-hammer removals, and twisting of the profile and *tranchet* removals are a frequent occurrence.
K	Ovate handaxe	A refined handaxe with an all-round cutting edge and an oval or discoidal planform. In all other ways they are akin to type J. This type grades imperceptibly into type J, making the JK intermediate type a common occurrence.
L	Segmental Chopping Tool	An uncommon tool characterised by a single sharpened edge parallel to the long axis, with the opposing edge 'thick and flat, affording a good handgrip'. They are further characterised by a flat butt, generally formed by a smooth naturally fractured surface. Wymer took this feature, and the distinctive 'tea-cosy' shape of type L implements, to represent the active selection of suitable raw materials for producing this shape of tool.
M	Ficron handaxe	An elegant and uncommon pointed type defined by its 'symmetrical concave edges'. These handaxes tend to be large.
N	Flat-butted cordate handaxe (*bout-coupé*)	A 'rare and elegant' form of handaxe which Wymer considered to be the last expression of the Acheulean culture. It is now considered to be part of the Middle Palaeolithic MTA toolkit.

A condensed version of Wymer's typology, set out in Wymer (1985) is preferred for inter-site typological comparisons. The compressed types are outlined below in table 4.5. The compressed typology permits a clearer comparison of types between sites and removes a degree of the arbitrary distinction between transitional types.

Table 4.5. A table showing the 'compressed' typology used by Wymer (1985), adopted here to allow simpler inter-site comparison by eliminating transitional types.

Compressed type.	Subsumed types
D	D, DF, DK

E	E, EF
F	F, FG
G	G, GJ, GK
H	H, GH, HK
J	J, JK
K	K
L	Omitted – generally low numbers
M	M, FM
N	Omitted – generally low numbers, and presumably intrusive or stratigraphically unrelated.

4.5. Technological attributes.

Technological attributes were recorded using a series of qualitative and quantitative measures, outlined below, and summarised in table 4.6.

- *Flake scar count*.

The number of flake scars over 5mm in any dimension were counted (both dorsal and ventral faces). This provided a broad measure of reduction intensity, particularly when expressed as an index (e.g., flake scars/L).

- *Tranchet removals*.

The presence of *tranchet* removals was recorded. A *tranchet* removal is the final or near-final removal from the tip of a handaxe to produce a long transverse or oblique cutting-edge relative to the long axis. Two examples from Boxgrove are shown in figure 4.5.

Figure 4.5. Two Boxgrove handaxes with tranchet removals producing a transverse cleaver-type tip.

This technological feature has often been posited as representing resharpening to extend a handaxes' use-life (e.g., Bergman & Roberts 1988; Roberts et al., 1999; White 2006; Shipton & Clarkson 2015). A very similar technological attribute, the *tranchet effect*, was recorded by Cranshaw (1983); in this case, the tip-forming removal was produced earlier in the reduction sequence but retained on the finished tool. Both are recorded as tranchet removals in the present study.

Tranchet removals were recorded as follows:

- (1) present
- (2) absent

- *Intensity of butt working*.

The intensity of reduction at the butt (i.e., the lower third of the handaxe) was gauged based on the presence or absence of areas of retained cortex *around the edges* of the butt.

Intensity of butt working was recorded as follows:

- (f) fully worked – no cortication around the edges in the lower third or the handaxe.
- (p) partially worked – some cortication around the edges in the lower third of the handaxe.
- (u) unworked – total cortication around the edges in the lower third of the handaxe.

- *Residual cortex*.

The per-centage of residual cortex was recorded (as a sum of the dorsal and ventral faces). Cortex cover was estimated to the nearest 5%. The proportion of residual cortex to worked area is an indicator of reduction intensity, and possibly also relates to ergonomic or prehensile features (e.g., Wynn & Gowlett 2018).

- *Position of residual cortex*.

The position of residual cortex was recorded based on the presence and location of cortex on either or both faces of the handaxe.

Position of residual cortex was recorded as follows:

- (n) none – no residual cortex.
- (b) butt – residual cortex entirely within the lower third of the handaxe.
- (m) mid – residual cortex entirely within the middle third of the handaxe.
- (a) all-over – areas of residual cortex spread over the whole handaxe (either contiguous or in patches).

- *Blank type*.

Where possible, the nature of the blank was identified as either a nodule/ river cobble, or a flake based on residual cortex and percussion features respectively. This simplified scheme follows Sharon (2010), except that the present uses three bins (flake, cobble/nodule, indeterminate) rather than Sharon's four (flake, probably flake, indeterminate, chunk). Understanding the blank form can provide insight into raw material procurement and conservation strategies (e.g., Ashton 2008) as well as being an indicator of reduction intensity.

Blank type was recorded as follows:

- (0) nodule or cobble – there is sufficient residual cortex *on both faces* to see some portion of the shape of the original raw material.
- (1) flake – either one face has clear features of a ventral (positive) flake (i.e., a striking platform, bulbar convexity, *eraillure* scars, compression ripples), or shows pronounced planform plano-convexity. The latter feature was not always recorded as a flake but was judged on a case-by-case basis based on the shape and refinement of the handaxe.
- (2) indeterminate – neither sufficient cortex, nor flake features are evident and the blank type cannot be determined.

Table 4.6. Key technological characteristics (Roe 1968; White 1995, 1998).

Measure	Description	Justification
Flake scar count	Sum of flake scars over 5mm from dorsal and ventral faces.	A broad measure of reduction intensity.
***Tranchet* removals**	Presence of *tranchet* removals, here defined as the final, or near-final removal from the tip, or near the tip, of a handaxe producing a long transverse cutting edge.	The presence of *tranchet* removals to produce cleavers has been noted at several purported MIS 10 – 8 sites (Roe 1968; Wenban-Smith 2004) and was a variable feature of Roe's morphometric Group I.
Intensity of butt working	A simple observation of whether the butt of the handaxe is fully, partially or un- worked.	This shows what, if any, effort was expended in shaping the butt of the handaxe.
Residual cortex	The area of residual cortex on the handaxe, estimated to the nearest 5%.	Another broad measure of reduction intensity.
Position of residual cortex	A simple observation of where residual cortex occurs.	This provides some indication of where the 'effort' of handaxe manufacturing was expended; or potentially, where useful cortex was intentionally retained.
Blank form	Where possible, the nature of the blank was identified as either a nodule/ river cobble, or a flake based on residual cortex and percussion features respectively.	This provides some insight into the blank form used to produce a handaxe. A nodule or cobble is indicated where there is residual cortex on both ventral and dorsal faces. A flake is indicated by preserved percussion features on one face (particularly a bulb of percussion, platform, or pronounced rippling on an

		almost unifacial face), or else pronounced plano-convexity.
Plano-convex profile	An observation of whether the handaxe has one flat and one convex face in profile.	This attribute is characteristic of a significant minority of handaxes from Wolvercote (Tyldesley 1986), Warsash (Davis et al. 2016) and Red Barns (Wenban Smith et al. 2000), all of which are purported MIS 10 – 8 sites, and it may therefore be a significant feature of the period.
Twisted tips	An observation of whether the handaxe has an S- or Z- twist on one or both edges.	Twisting of the profile is a notable and chronologically distinctive feature of ovates and cordates from MIS 11 (White et al. 2019), although seemingly rare in MIS 9 (Roe 1968; White 1998).

4.6. Symmetry

Symmetry indices were produced from planform photographs of handaxes using FlipTest v09 software, which produces an 'Index of Asymmetry' (IOA) based on the deviation in symmetry (counted as pixels) between an image and its 'mirror' when the two are overlaid (Hardaker & Dunn 2005). The 'Index of Asymmetry' ranges from 1 to greater than 15, with lower numbers being more symmetrical. Hardaker & Dunn's interpretation of the Index of Asymmetry is given below in table 4.7, showing the Handaxe Symmetry Classes (HSC).

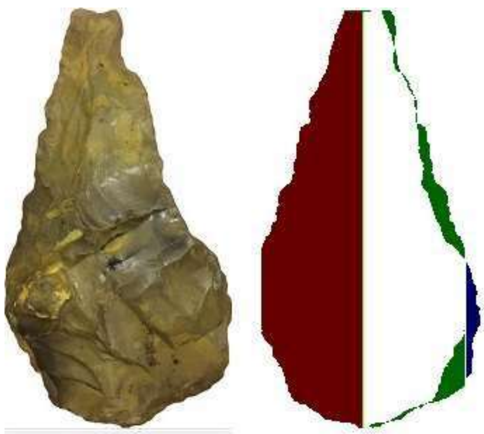
Table 4.7. Interpretation of the Index of Asymmetry, Hardaker & Dunn (2005).

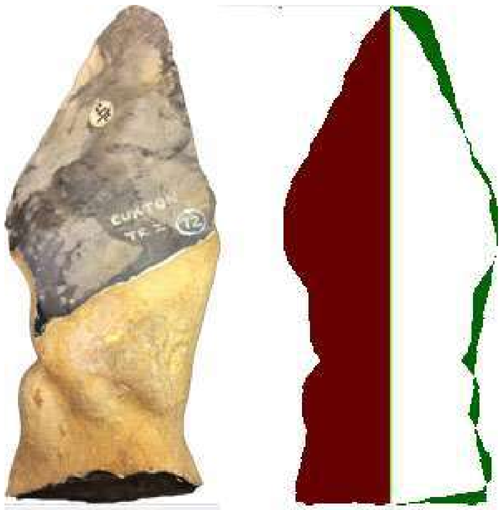
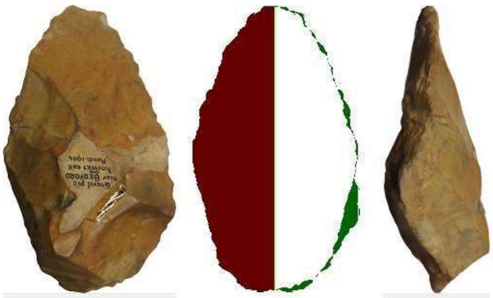
Class	Index of Asymmetry	Level of Symmetry	Interpretation (Hardaker & Dunn 2005)
1	1.0 – 1.49	Virtually perfect	'Suggests and almost mathematical level of precision…'.
2	1.5 – 2.99	Very high	'An exceptionally skilled craftsman'.
3	3.0 – 3.99	High	'Skilled work'.
4	4.0 – 4.99	Moderate	
5	5.0 – 5.99	Low	'Look for intractable material, or eccentric shape e.g., on butt'.

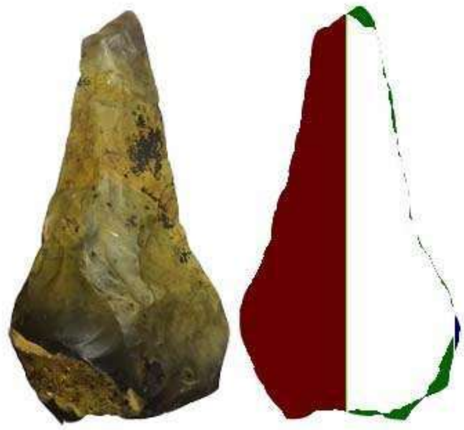
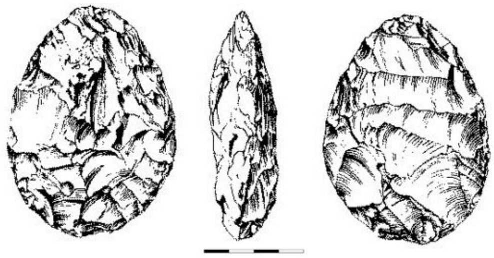
6	6.0 & above	Very low	'Look for intractable material, serious material defects, eccentric shape or a modern break…'.

In addition to the quantitative FlipTest, nine novel qualitative observations were made regarding overall handaxe symmetry. These observations were essentially 'by eye' judgements of macroscopic planform asymmetry, following the reasoning of McNabb et al., (2004) that hominins themselves would have been able to identify such asymmetrical features easily on their own creations. These subjective features are shown in table 4.8 below.

Table 4.8. Novel attribute measurements relating to planform and profile symmetry. Many have possible ergonomic or prehensile qualities.

Measure	**Type and image.**	**Justification**
Macroscopic planform asymmetry	Planform lop-sidedness. 	Lop-sidedness was recoded on rounded forms, where the mass of the handaxe was significantly more to one side of the major axis than the other resulting in macroscopic asymmetry. Lop-sidedness was noted as a significant feature of the handaxe assemblage at the MIS 9 site at Broom (Hosfield et al., 2013a, b, c).
	Demificrons. 	Essentially the same as lop-sided handaxes (above), but with macroscopic asymmetry imposed on elongate pointed types. In simple terms, it represents half of a ficron, although crudely pointed types may also display this characteristic. Demificrons were noted at several key MIS 9 sites (e.g., Furze Platt, Baker's Farm) by Cranshaw (1983).

	Notching. 	Notching was recorded where an indentation was added towards the tip of the handaxe, again producing macroscopic asymmetry. This feature has recently been noted at the MIS 9 site of Protheroe’s Nursery, Leytonstone (Taylor 2019).
Backing resulting in planform asymmetry.	Cortical ‘grip’ or backing. 	This was recorded where cortex was retained in a position which could have conferred an ergonomic or prehensile advantage, often (but not always) at the expense of planform asymmetry.
	Méplat or crude oblique backing 	Where an edge towards the butt of the handaxe was shaped to have a macroscopically asymmetrical, flat, obliquely angled ‘shoulder’, it was recorded as a *méplat.* These features have been noted as a form of crude backing in MIS 9 assemblages (e.g., Lee 2001; Hardaker 2003). This attribute can overlap

		with the 'cortical backing' attribute (above), where the oblique angle is formed from the natural shape of the raw material.
Imposed complex symmetry	Planform biconcavity. 	Planform biconcavity is the defining feature of the ficron (type M), but can also occur on crude types.
	Twisted profile  *Swanscombe handaxe from Waechter (1973)*	Twisting of the profile is a notable and chronologically distinctive feature of ovates and cordates from MIS 11 (White et al. 2019), although seemingly rare in MIS 9 (Roe 1968; White 1998).

4.7. Taphonomy

Condition was recorded using a standard four-division categorisation (e.g., Wymer 1968; Cranshaw 1983; Ashton 1998; Marshall et al. 2002). Reference images for each category are shown below, following the methodology of Hosfield & Green (2013) who used objects in the ADS database (Marshall et al., 2002). Handaxes from Warren Hill were selected as reference objects for this study as they are made on flint and occurred in all four condition categories (figure 4.6). The condition category names used here follow Dale (2020), adapted from Cranshaw (1983).

- Very fresh (corresponding to Marshall et al., (2002) 'Fresh' category, using ADS Database handaxe no. 29 as a reference).

- Slightly rolled (corresponding to Marshall et al., (2002) ‘Lightly Abraded’ category, using ADS Database handaxe no. 309 as a reference)
- Rolled (corresponding to Marshall et al., (2002) ‘Abraded’ category, using ADS Database handaxe no. 199 as a reference)
- Very rolled (corresponding to Marshall et al., (2002) ‘Rolled’ category, using ADS Database handaxe no. 85 as a reference)

Figure 4.6. A reference image for handaxe condition, using photographs from the ADS database (Marshall et al., 2002). Handaxes are all from Warren Hill and show the following conditions: very fresh (top left, no. 29), slightly rolled (top right, no. 309), rolled (lower left, no. 199), very rolled (lower right, no. 85).

Post depositional loss-of-mass (i.e., breakage and fragmentation) was recorded where the principal metrics were significantly affected. In cases where neither typology nor metrics were distinguishable, the fragment was eliminated from the sample.

4.8. Summary.

The methodology selected is intended to provide a broad and comprehensive analysis of MIS 9 handaxes, using methods which can be quickly and easily carried out at museums without specialist equipment. The most important analytical methods are the morphometric analysis of Roe (1968a), which used a range of metrics and indices to identify shape preferences, and the typological analysis of Wymer (1968). Additional attributes are recorded relating to technology (particularly regarding reduction intensity), prehensile features and symmetry.

Chapter Five: Results.

5.1 Introduction.

The results of the study are presented in this chapter, arranged according to the method of analysis used. Full interpretation of the results will be undertaken in the following chapters however some initial sorting of the data (particularly following the sorting method of Roe (1968a)) will also be made here. The results chapter is supplemented by a full presentation of the data (Appendix I) along with a range of summary tables and graphs (Appendices II - III).

5.2. Morphometrics.

The following section presents the collected metrical data according to the processes outlined in Roe (1968a), a multi-tiered sorting methodology designed to identify shape preferences and supported by selected technological attributes. The sorting process is presented here, before a full discussion of individual sites in the following chapters.

Principal metrical averages are presented for each site in table 5.1. Averages from Roe (1968a) are given for Group I, III and IV sites. His sites are at the top of table 5.1 in standard lettering. The sites for which new data was collected by the author of this study are in **bold**. Sites culled from the work of previous researchers (both published and unpublished) are added to the bottom of the list in *italics*. This is repeated throughout this section. Where specific data was not obtained, the relevant cell is marked ‘x’.

Table 5.1. Principal metrical averages for all sites measured by the author, rounded to the nearest whole mm. All values are mm., except for weight (g). Standard deviations added in parentheses where these could be calculated.

	n.	L	B	B (half)	T	Wt	L1	B1	B2	T1	T2
Furze Platt	475	x	x	x	x	x	x	x	x	x	x
Baker’s Farm	239	x	x	x	x	x	x	x	x	x	x
Cuxton	184	x	x	x	x	x	x	x	x	x	x
Whitlingham	143	x	x	x	x	x	x	x	x	x	x
Twydall	55	x	x	x	x	x	x	x	x	x	x
Stoke Newington	63	x	x	x	x	x	x	x	x	x	x
Wolvercote	47	x	x	x	x	x	x	x	x	x	x
Broom	172	x	x	x	x	x	x	x	x	x	x
Barton Cliffs	110	x	x	x	x	x	x	x	x	x	x
Shide (Pan Farm)	44	x	x	x	x	x	x	x	x	x	x
Aylesford	87	126 (32)	76 (14)	x	36 (9)	x	43 (14)	43 (12)	68 (15)	17 (4)	30 (9)
Baker's Farm	30	135 (35)	76 (16)	64 (14)	39 (9)	358 (202)	41 (20)	44 (14)	71 (17)	15 (4)	33 (7)

Barnham Heath	83	128	81	73	44	407	48	51	68	21	35
Biddenham	108	115 (27)	71 (17)	63 (16)	36 (9)	297 (207)	36 (16)	40 (15)	63 (15)	15 (4)	32 (9)
Bromham	25	124 (28)	72 (13)	x	36 (7)	x	40 (12)	41 (15)	65 (12)	16 (4)	30 (7)
Canterbury West	17	151 (38)	84 (17)	x	41 (12)	x	48 (22)	47 (20)	77 (17)	17 (4)	35 (12)
Cookham	108	115 (28)	68 (14)	58 (14)	39 (10)	296 (225)	35 (16)	38 (14)	58 (15)	16 (7)	32 (10)
Cuxton	175	124 (36)	70 (16)	62 (16)	42 (11)	378 (263)	39 (18)	41 (15)	63 (15)	15 (5)	35 (11)
Dunbridge	97	113 (29)	72 (13)	66 (13)	36 (9)	299 (166)	38 (15)	44 (13)	64 (12)	17 (5)	30 (10)
Farnham C	26	112 (27)	73 (19)	67 (21)	36 (8)	x	39 (18)	47 (19)	64 (14)	17 (5)	29 (7)
Furze Platt	445	125 (29)	71 (15)	61 (14)	40 (9)	336 (200)	38 (16)	39 (13)	64 (14)	15 (4)	35 (9)
Ham Hill (Snodland)	19	133 (42)	76 (18)	x	39 (9)	x	46 (25)	48 (18)	71 (17)	15 (4)	32 (10)
Hillingdon	99	119 (31)	73 (16)	65 (16)	36 (8)	250 (158)	38 (17)	43 (16)	64 (15)	16 (6)	30 (8)
Iver	139	108 (29)	67 (15)	59 (14)	35 (9)	274 (197)	35 (16)	37 (13)	61 (14)	16 (5)	30 (8)
Kempston	120	102 (23)	66 (13)	59 (13)	34 (8)	239 (138)	34 (12)	38 (12)	59 (13)	15 (5)	29 (8)
Keswick	24	152 (36)	90 (17)	81 (20)	40 (7)	x	52 (21)	58 (19)	81 (15)	17 (3)	36 (9)
Lent Rise	108	111 (23)	67 (14)	60 (14)	37 (9)	274 (150)	38 (17)	39 (14)	59 (13)	16 (5)	31 (8)
Leyton	72	110 (27)	70 (15)	63 (14)	35 (7)	297 (182)	34 (14)	41 (13)	63 (13)	16 (4)	29 (7)
Lower Clapton	42	102 (22)	64 (13)	55 (15)	34 (8)	x	35 (17)	37 (13)	58 (12)	14 (3)	29 (8)
Ruscombe	88	129 (28)	74 (14)	63 (13)	41 (8)	366 (197)	36 (14)	40 (12)	68 (14)	16 (4)	35 (8)
Stoke Newington	232	93 (23)	58 (13)	51 (13)	32 (8)	175 (117)	30 (13)	34 (12)	52 (13)	13 (4)	27 (8)
Thetford	59	128 (30)	76 (15)	65 (15)	38 (10)	336 (220)	39 (17)	43 (13)	68 (16)	18 (5)	32 (9)
Twydall	40	122 (36)	71 (17)	61 (16)	37 (8)	313 (216)	38 (18)	39 (14)	64 (15)	14 (3)	31 (8)
Warsash	148	135 (37)	79 (19)	68 (19)	37 (10)	417 (218)	44 (21)	46 (18)	70 (18)	17 (5)	32 (10)
Wolvercote	39	112 (38)	68 (17)	59 (16)	32 (7)	x	30 (12)	35 (11)	62 (17)	15 (4)	28 (7)
Berinsfield (Lee 2001)	37	125	78	x	41	x	46	46	67	19	37
Stanton Harcourt (Lee 2001)	39	135	82	x	39	x	45	46	74	19	36
Wolvercote (Lee 2001)	40	126	74	x	34	x	37	38	65	18	29
Broom (Hosfield & Green 2013)	1230	132	86	78	35	411	x	46	49	19	30
Whitlingham (White pers. comm, Nov 2020.)	117	121	70	x	38	329	41	45	63	17	35
Wolvercote (White pers. comm., Nov. 2020)	60	119	70	x	35	279	36	37	64	16	31
Wolvercote (Tyldesley 1986)	44	126	70	x	38	296	39	36	63	16	x
Bemerton (Egberts 2016)	100	103	71	x	32	257	x	x	x	X	X
Woodgreen (Egberts 2016)	389	98	67	x	32	232	x	x	x	X	x
Milford Hill (Egberts 2016)	346	123	74	x	38	351	x	x	x	x	x

Principal index averages are presented for each site in table 5.2.

*Table 5.2. Principal index averages for all sites measured by the author. Index values from Roe marked * are estimated from figures in Roe (1968a). Standard deviations added in parentheses where these could be calculated.*

	T/B	B/L	L_1/L	B1/B2	T1/T2
Furze Platt	0.568	0.587*	0.330	0.655*	x
Baker's Farm	0.583	0.595*	0.370	0.760*	x
Cuxton	0.610	0.588*	0.341	0.687*	x
Whitlingham	0.533	0.595*	0.343	0.687*	x
Twydall	0.566	0.590*	0.338	0.650*	x
Stoke Newington	0.610	0.615*	0.363	0.740*	x
Wolvercote	0.559	0.560*	0.311	0.565*	x
Broom	0.469	0.640*	0.377	0.730*	x
Barton Cliffs	0.483	0.695*	0.364	0.695*	x
Shide (Pan Farm)	0.435	0.715*	0.351	0.720*	x
Aylesford	0.478 (0.09)	0.620 (0.10)	0.347 (0.12)	0.653 (0.19)	0.600 (0.18)
Baker's Farm	0.514 (0.09)	0.582 (0.08)	0.297 (0.12)	0.643 (0.22)	0.453 (0.17)
Barnham Heath	0.550	0.646	0.376	0.769	0.665
Biddenham	0.513 (0.11)	0.629 (0.09)	0.318 (0.11)	0.632 (0.18)	0.491 (0.16)
Bromham	0.494 (0.07)	0.594 (0.10)	0.328 (0.10)	0.623 (0.19)	0.545 (0.16)
Canterbury West	0.489 (0.10)	0.569 (0.11)	0.331 (0.16)	0.621 (0.24)	0.565 (0.27)
Cookham	0.581 (0.11)	0.597 (0.08)	0.302 (0.11)	0.707 (0.46)	0.549 (0.53)
Cuxton	0.589 (0.14)	0.584 (0.09)	0.321 (0.12)	0.661 (0.21)	0.443 (0.17)
Dunbridge	0.499 (0.11)	0.657 (0.12)	0.332 (0.10)	0.679 (0.19)	0.154 (0.06)
Farnham C	0.512 (0.14)	0.658 (0.13)	0.341 (0.12)	0.728 (0.21)	0.591 (0.20)
Furze Platt	0.565 (0.10)	0.575 (0.08)	0.305 (0.11)	0.610 (0.19)	0.232 (0.17)
Ham Hill (Snodland)	0.518 (0.14)	0.601 (0.13)	0.348 (0.14)	0.687 (0.25)	0.528 (0.19)
Hillingdon	0.511 (0.11)	0.619 (0.10)	0.313 (0.10)	0.665 (0.17)	0.551 (0.19)
Iver	0.527 (0.12)	0.642 (0.11)	0.324 (0.11)	0.617 (0.17)	0.556 (0.18)
Kempston	0.527 (0.11)	0.646 (0.10)	0.329 (0.10)	0.640 (0.17)	0.529 (0.20)
Keswick	0.452 (0.08)	0.605 (0.09)	0.348 (0.13)	0.714 (0.23)	0.481 (0.13)
Lent Rise	0.560 (0.12)	0.614 (0.11)	0.361 (0.14)	0.691 (0.23)	0.536 (0.18)
Leyton	0.516 (0.12)	0.650 (0.12)	0.316 (0.11)	0.642 (0.18)	0.575 (0.18)
Lower Clapton	0.549 (0.13)	0.638 (0.09)	0.333 (0.12)	0.641 (0.20)	0.497 (0.16)
Ruscombe	0.557 (0.09)	0.583 (0.08)	0.323 (0.09)	0.617 (0.17)	0.468 (0.13)
Stoke Newington	0.553 (0.12)	0.634 (0.11)	0.327 (0.11)	0.658 (0.21)	0.499 (0.18)
Thetford	0.503 (0.11)	0.605 (0.09)	0.310 (0.11)	0.630 (0.28)	0.559 (0.23)
Twydall	0.519 (0.09)	0.604 (0.08)	0.315 (0.12)	0.622 (0.22)	0.122 (0.04)
Warsash	0.472 (0.10)	0.599 (0.10)	0.328 (0.13)	0.675 (0.29)	0.126 (0.03)
Wolvercote	0.490 (0.12)	0.632 (0.13)	0.279 (0.08)	0.571 (0.15)	0.306 (0.08)
Berinsfield (Lee 2001)	0.519	0.635	0.370	0.702	0.538

Stanton Harcourt (Lee 2001)	0.483	0.627	0.336	0.626	0.563
Wolvercote (Lee 2001)	0.481	0.607	0.295	0.627	0.627
Broom (Hosfield & Green 2013)	0.411	0.668	X	0.591	0.665
Whitlingham (White pers. comm, Nov 2020.)	0.542	0.595	0.349	0.738	0.522
Wolvercote (White pers. comm., Nov. 2020)	0.520	0.604	0.317	0.587	0.535
Wolvercote (Tyldesley 1986)	0.552	0.573	0.317	0.581	x
Bemerton (Egberts 2016)	0.45	0.70	0.39	0.76	0.74
Woodgreen (2016)	0.48	0.70	0.36	0.72	0.70
Milford Hill (2016)	0.52	0.61	0.34	0.68	0.63

Roe (1968a) produced tripartite diagrams for each site in his study, along with an interpretative key (shown in Appendix II). Each part of the tripartite diagram represents the fraction of the sample which falls into each of the planform shape categories: the pointed fraction ($L_1/L < 0.35$) is on the right, the ovate fraction ($L_1/L >0.35, <0.55$) is in the centre, and the cleaver fraction ($L_1/L >0.55$) is on the left. Once sorted, the elongation index (B/L, *x axis*) was plotted against the tip shape index (B1/B2, *y axis*) for each handaxe. The data for Bemerton, Woodgreen and Milford Hill were only available as tripartite diagrams and are reproduced directly from Egberts (2016).

Condition data have been colour coded into the tripartite diagrams to quickly identify whether differences in morphology can be linked to condition. As outlined in the methodology, this study uses a four-category condition scale, coded in blue. Lee (2001) used his own three category condition scale, coded in brown (shown in Appendix II) for the sites of Berinsfield, Stanton Harcourt and Wolvercote (Lee sample). Tripartite diagrams for each site are shown in Appendix II.

5.2.1. Primary sorting (shape traditions).

Roe (1968a) observed that handaxe shapes, when reduced to elongation, tip shape and planform indices, did not occur randomly in the 38 sites in his study; rather, distinctly grouped morphological preferences became apparent. These preferences were often less clear in sites with smaller sample sizes (a factor which will be borne in mind when sorting the data in this study). Roe's primary sorting involved allocating each site to a broad 'tradition' based on the proportion of handaxes falling into each of the three planform (L_1/L) categories.

Roe established two main traditions:

1. Point dominant tradition, where 60% or more of the handaxes in an assemblage have L_1/L values lower than 0.35 (i.e., 60% or more of the assemblage is metrically pointed).
2. Ovate dominant tradition, where 60% or more of the handaxes in an assemblage have L_1/L

values between 0.35 and 0.55 (i.e., 60% or more of the assemblage is metrically ovate).

A ‘cleaver dominant’ tradition is technically possible, but was not identified by Roe (1968a), nor has it been identified in Britain in subsequent studies, although some African sites may exceed the 60% threshold needed for cleaver-dominance (White 2006). In addition to the two ‘dominant’ traditions, Roe established two ‘uncommitted’ traditions, where a ‘clear majority’ one way or the other existed but failed to reach the 60% threshold.

3. Point (uncommitted), where metrically pointed handaxes comprised at least 5% more than metrically ovate handaxes but did not comprise 60% of the assemblage in total.
4. Ovate (uncommitted), the reverse of the above.

For very evenly distributed sites, Roe suggested a fifth tradition.

5. Uncommitted, where the difference between metrically ovate and pointed types was less than 5% of the total assemblage.

The results of the primary sorting of sites in this study, alongside Roe’s original sites, are shown below in table 5.3.

Table 5.3. Primary sorting of sites according to Roe's (1968a) methodology.

Pointed dominant		**Uncommitted (pointed)**		**Uncommitted**				**Uncommitted (ovate)**		**Ovate dominant**	
60% or more with L_1/L less than 0.35		'Clear majority' points, but not exceeding 60%.		Less than 5% difference between proportions of ovates and points.				'Clear majority' ovates, but not exceeding 60%.		60% or more with L_1/L between 0.35 and 0.55.	
Site	% Pointed	Site	% Pointed	Site	% Pointed	% Ovate	% Cleavers	Site	% Ovates	Site	% Ovates
Wolvercote	83	Whitlingham	58.5	Great Pan Farm (Shide)	50	50	0	Broom	58.5	Gaddesden Row	88.9
Swanscombe M.G.	79.9	Cuxton	56.9	Wallingford	50.5	49.5	0	Santon Downham	58	High Lodge	86.6
Chadwell St. Mary	68.6	Twydall	54.6	Stoke Newington	47.7	46.0	6.3	Barton Cliff	57.8	Warren Hill (fresh)	85.6
Hoxne	67.9	Foxhall Road	52.7	***Woodgreen (Egberts 2016)***	***49.60***	***46.30***	***4.1***	Fordwich	52.3	Croxley Green	81.1
Furze Platt	64.8	Baker's Farm	49.1	**LENT RISE**	**47.22**	**42.59**	**10.19**	***Bemerton (Egberts 2016)***	***47.9***	Holybourne	78.9
Dovercourt	63	**AYLESFORD**	**59.77**							Highlands Farm	78.1
Hitchin	60.8	**CUXTON**	**59.43**							Allington Hill	75.9
WOLVERCOTE	**79.49**	**FURZE PLATT (CP)**	**58.54**							Corfe Mullen	75.6
Wolvercote (Lee 2001)	***76.47***	***Milford Hill (Egberts 2016)***	***58.10***							Caddington	74.3
COOKHAM	**75.93**	**HAM HILL (SNODLAND)**	**57.89**							Bowman's Lodge	72.4
THETFORD	**74.58**	**STOKE NEWINGTON**	**56.9**							Tilehurst	72.3
BAKER'S FARM	**73.3**	***Whitlingham (M. White pers. comm. Nov 2020)***	***56.41***							Warren Hill (worn)	71.9
Wolvercote (M. White pers. comm. Nov 2020)	***72.73***	**FARNHAM C**	**53.85**							Farnham A	71.8
BROMHAM	**72.00**	**LOWER CLAPTON**	**52.38**							Round Green	71.4
BIDDENHAM	**69.44**	**BARNHAM HEATH**	**49.4**							Elveden	69.9
LEYTON	**69.44**									Caversham	69.1

RUSCOMBE	**67.05**	***Berinsfield (Lee 2001)***	***48.65***	Oldbury	67.7
FURZE PLATT (CCF)	**66.29%**			Swanscombe U.L	66.7
WARSASH	**65.54**			Knowle Farm	65.1
TWYDALL	**65**			***Broom (Hosfield et al. 2013b)***	***61.5***
CANTERBURY WEST	**64.71**				
HILLINGDON	**64.65**				
DUNBRIDGE	**63.92**				
IVER	**63.31**				
KESWICK	**62.5**				
Stanton Harcourt (Lee 2001)	***61.54***				
KEMPSTON	**60.83**				

5.1.2. Secondary sorting (group affinity).

Roe's secondary sorting compared the average elongation (B/L) and tip shape (B1/B2) index values for each assemblage, divided into planform shape tradition preferences according to the results of the primary sorting. Uncommitted sites were assigned to one or the other of the major traditions based on the mean average planform index value (e.g., an uncommitted site with an average L1/L value less than 0.35 was sorted into the point (uncommitted) tradition). Roe added standard deviation values (one quarter standard deviation) for both elongation and tip shape in his secondary sorting graphs, as a way of illustrating the considerable overlap between samples. Roe's secondary sorting graphs for 'dominant' sites (ovate or pointed) is shown in figure 5.1; the same graphs for 'uncommitted' sites is shown in figure 5.2. The standard deviation error bars were found to make the graphs unreadable in the present study, due to the large number of sites under consideration: this is illustrated in figure 5.3, which shows only a selected handful of sites from the pointed (dominant) group with 0.25* standard deviation bars added; clearly, the addition of such error bars to the complete set of sites would be unintelligible. Suffice it to say, there is a high degree of overlap between all sites. Despite this, Roe's grouping was based primarily on the dispersal of mean values (regardless of overlapping standard deviations), and so the results are presented again in figures 5.4 – 5.6 without standard deviations but with approximation of the metrical 'regions' of Roe's original groups added, along with site names.

The clustering of the mean elongation and tip shape values for assemblages within each planform category allows discrete groups to be identified. Roe cautioned against overreliance on using averages to establish groups, suggesting that consultation of individual site tripartite diagrams is necessary; this is especially true of discriminating between Roe's Group I and II, which share somewhat similar morphological characteristics (a point returned to in the discussion). Secondary sorting for point dominant sites is shown below in figure 5.4, for point (uncommitted) sites in figure 5.5, and for ovate (uncommitted) and uncommitted sites in figure 5.6.

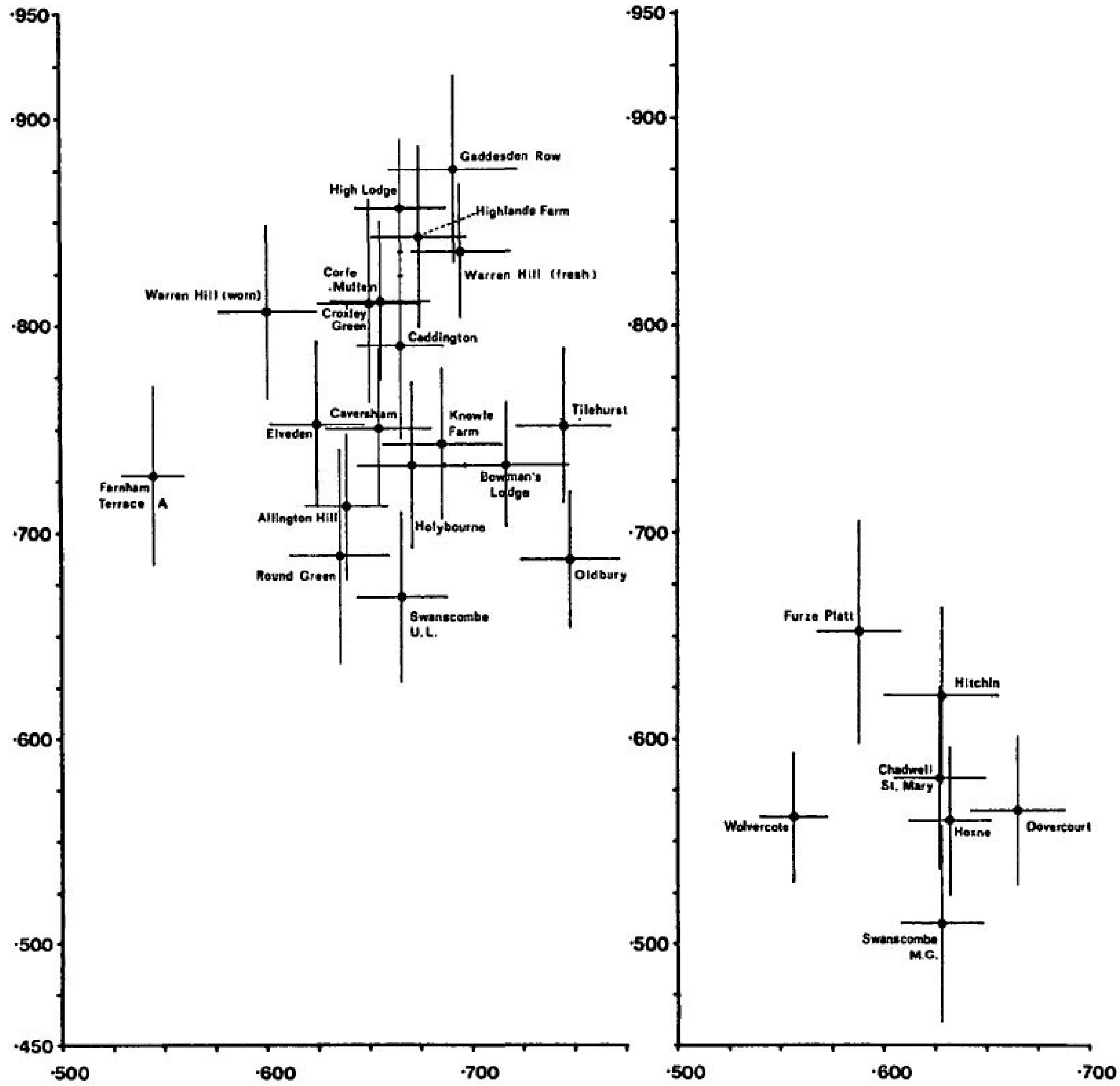


Figure 5.1. Roe's secondary sorting diagrams from Roe (1968a). The diagram on the left shows sites with more than 60% ovate planforms (i.e., is ovate-dominated). The diagram on the right shows sites with more than 60% pointed planforms (i.e., is point-dominated). Error bars show ¼ standard deviation for both elongation (horizontal) and tip shape (vertical).

F

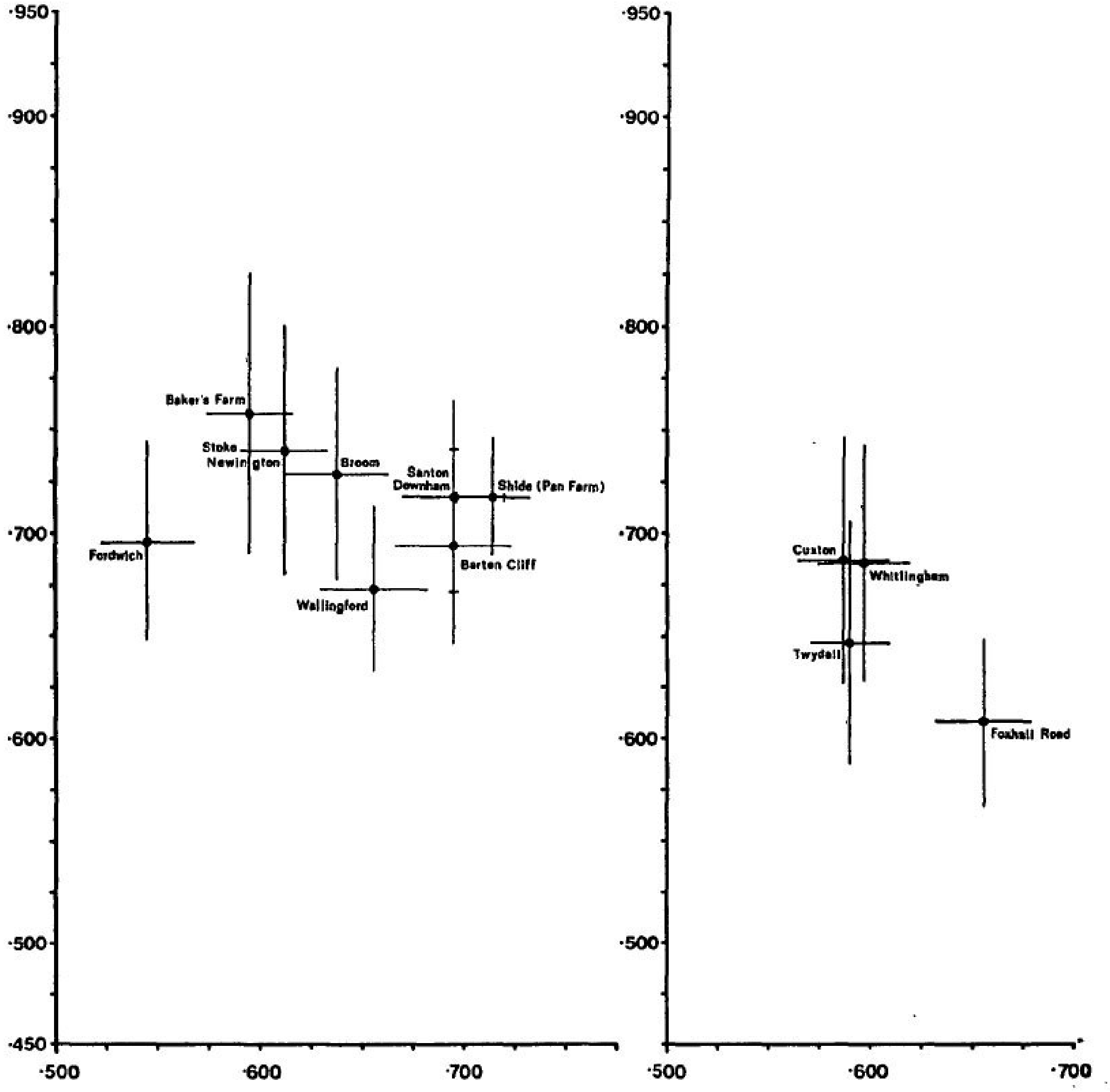


Figure 5.2. Roe's secondary sorting diagrams from Roe (1968a). These show the ovate (uncommitted) sites (left) and the pointed (uncommitted) sites (right).

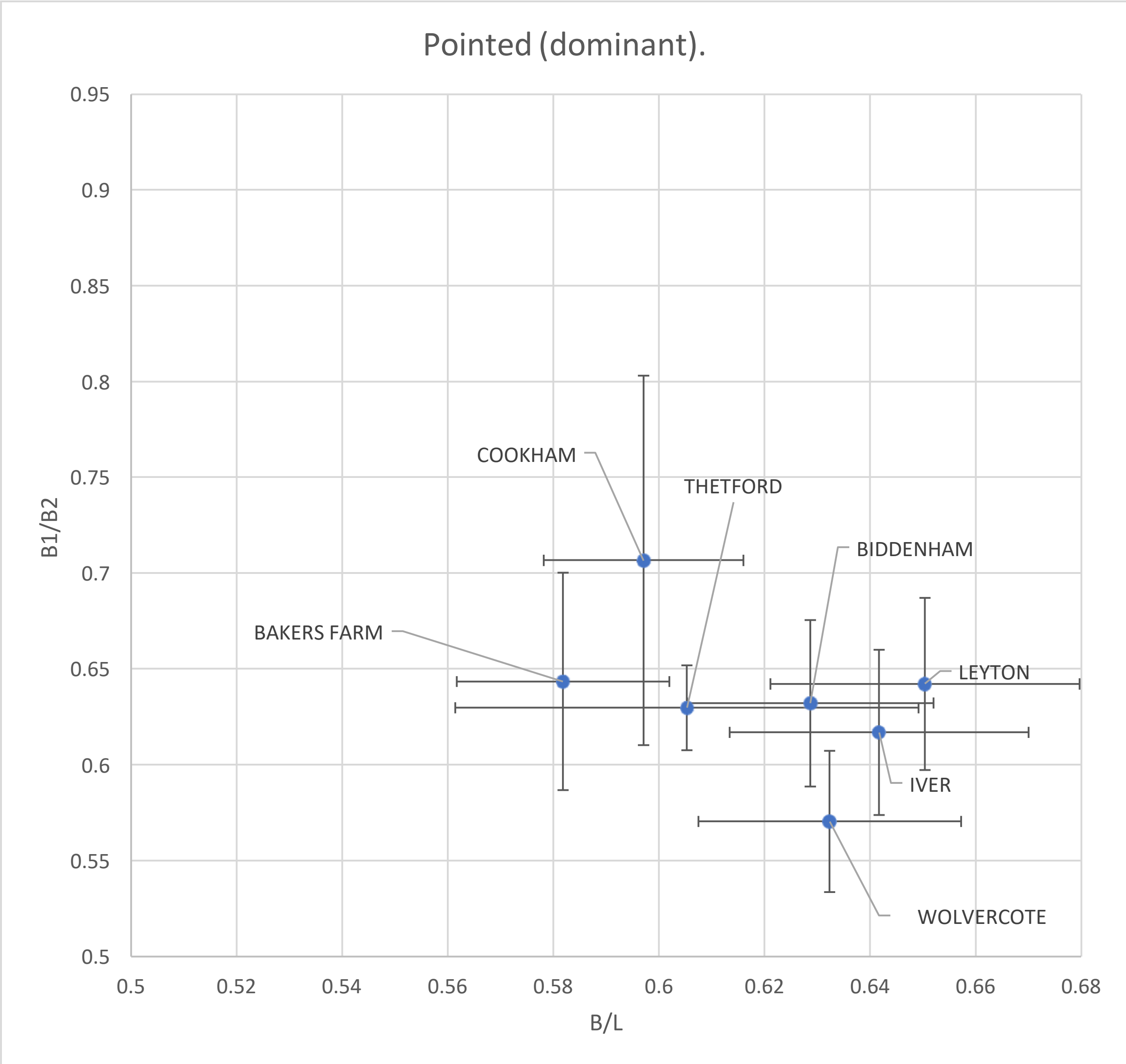


Figure 5.3. A secondary sorting graph for selected sites in the pointed (dominant) category. This graph shows error bars representing 0.25 Standard Deviation; this follows Roe's use of 0.25* Standard Deviation to show the high degree of variation within assemblages. Nevertheless, Roe primarily used metrical averages to determine his morphometric groups. Standard Deviation is not shown on the graphs below, for the sake of clarity; suffice it to say, there is a high degree of overlap between all sites.*

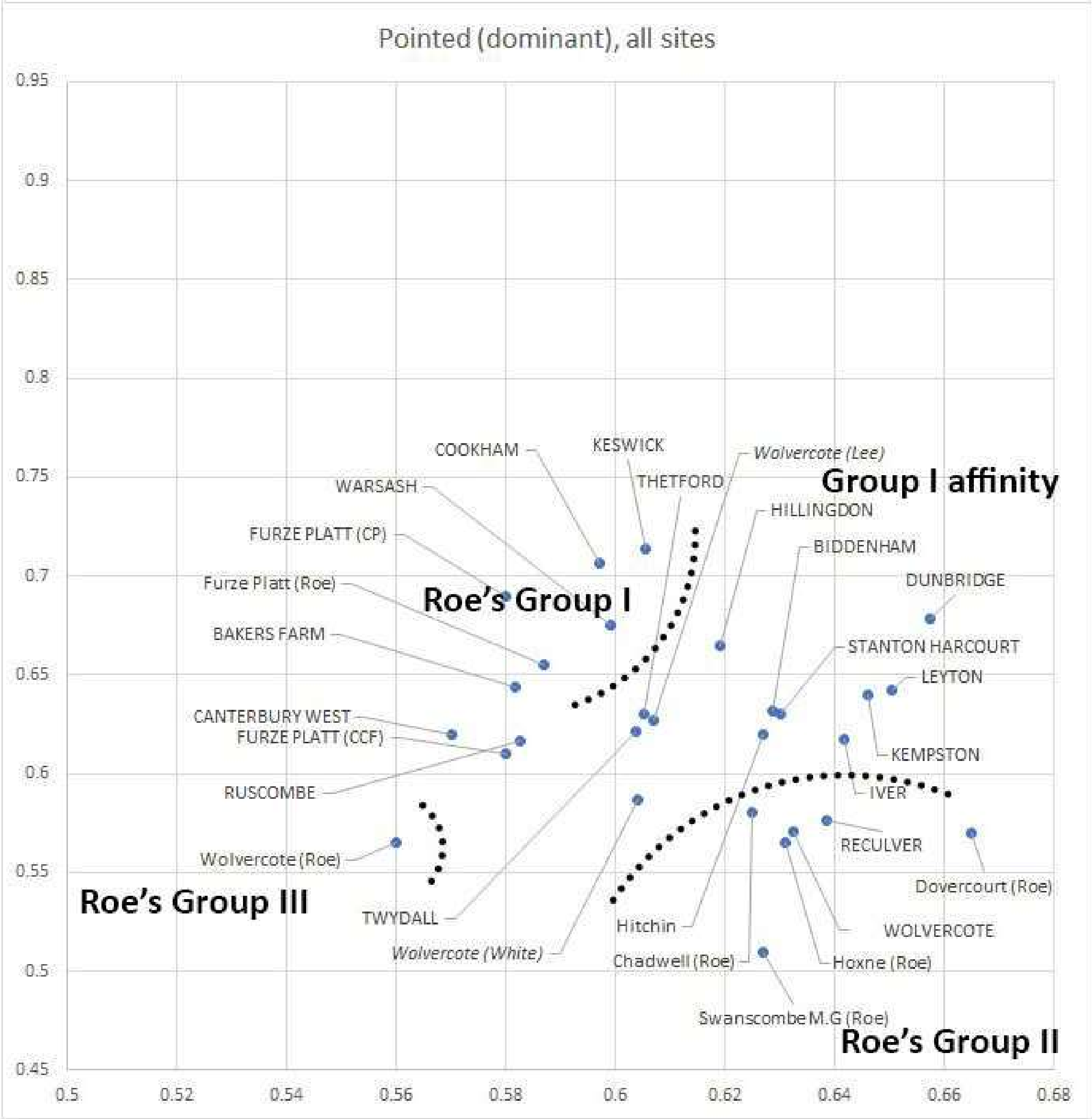


Figure 5.4. Secondary sorting of point (dominated) sites. The approximate 'regions' of Roe's Groups I, II and III are marked. Sites analysed by the author are in CAPITALS.

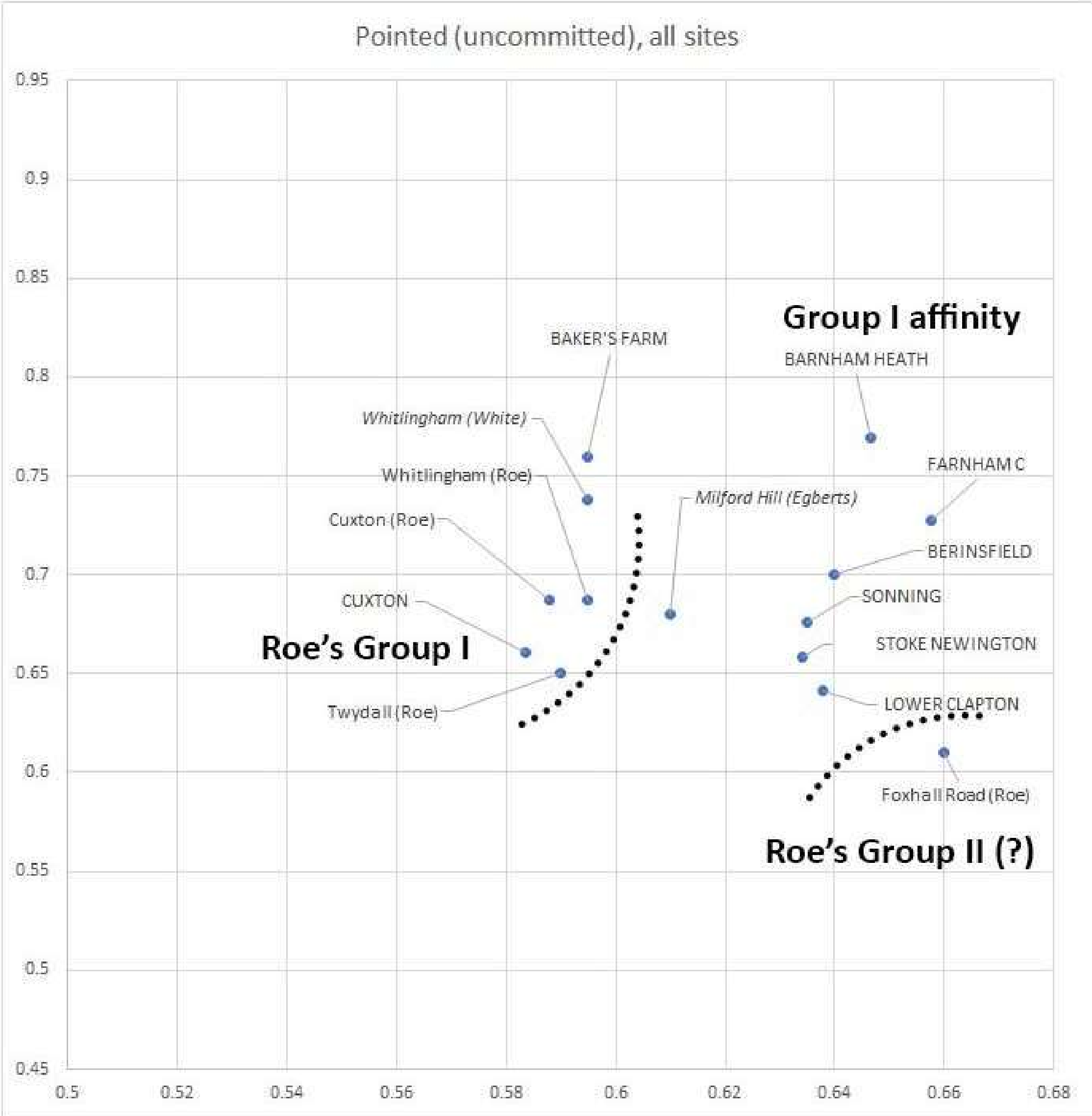


Figure 5.5. Secondary sorting of point (uncommitted) sites. The approximate 'regions' of Roe's Groups I and II are marked. Sites analysed by the author are in CAPITALS.

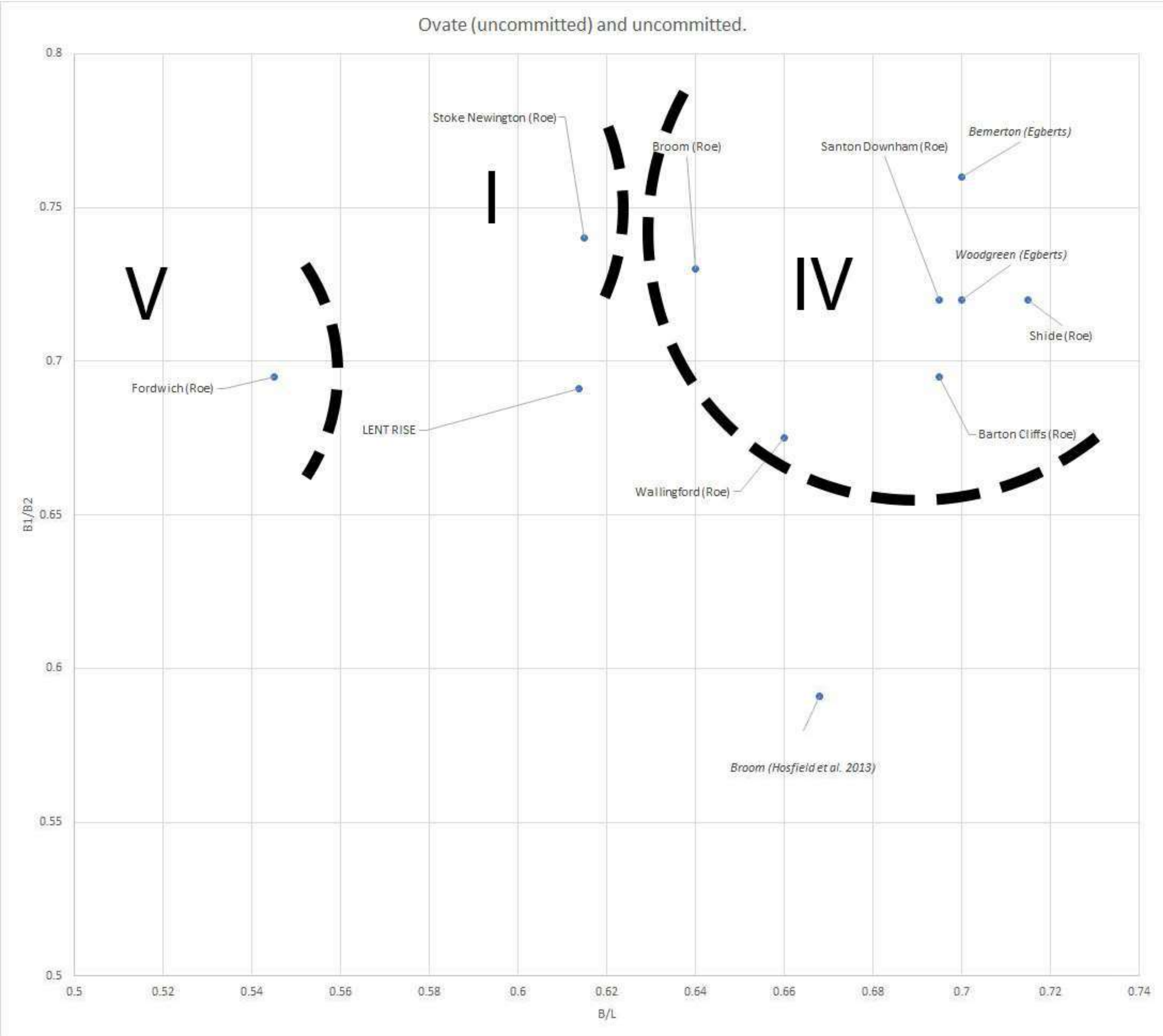


Figure 5.6. Secondary sorting for the ovate (uncommitted) and uncommitted sites. The approximate 'regions' of Roe's Groups I, IV and V are marked. Sites analysed by the author are in CAPITALS.

Most sites in this study fall into the point dominant tradition. Within this tradition, Roe identified three groups. Of his sites, the Wolvercote assemblage was singled out for being particularly narrow with a very strong preference for pointed types (although not of the most extreme types, such as ficrons); this became the sole member of Roe's Group III. A preference for narrow forms was also noted at Furze Platt, although a high standard deviation in tip-shape suggested greater variety in shape. Pointed and ovate types were often found to be 'pear shaped', and the pointed fraction included 'extreme' forms such as ficrons. Square ended and fan-shaped cleavers were also a notable component; Furze Platt became the nucleus for Roe's Group I (pointed, with cleavers). The largest group in Roe's point dominant tradition included Swanscombe (Middle Gravels), Chadwell St Mary, Hoxne, Dovercourt and Hitchin. These assemblages tended towards broadness rather than narrowness, even in 'extreme' pointed forms such as ficrons, and cleavers were notably less of a feature than at Furze Platt; these sites formed the core of Roe's Group II (pointed, with ovates).

The tripartite shape diagrams for each point dominated assemblage may be compared to the point dominant groups described by Roe (above). Those clearly similar to Roe's Furze Platt sample (generally narrow, preference for pear shapes, a component of 'extreme' points and an important component of cleavers) are:

1. Cookham
2. Ruscombe
3. Warsash
4. Furze Platt
5. Keswick
6. Canterbury West
7. Bromham
8. Thetford
9. Twydall
10. Baker's Farm (although this site lacks metrical cleavers, probably as a result of the small sample size).

Several of the point dominated sites are similar to Roe's Furze Platt (Group I) but show a wider diversity of elongation values (including both narrower and broader handaxes) in their tripartite diagrams; consequently, they plot to the right of Roe's Group I (i.e., are broader on average). Nevertheless, these sites still have 'extreme' points, some preference for pear-shapes, and cleavers. These sites are:

1. Biddenham
2. Leyton
3. Iver
4. Kempston
5. *Stanton Harcourt (Lee 2001)*
6. Dunbridge. This appears to be a special case, where the morphometric profile is segregated based on condition; the fresher component resembles Roe's Group I, the more rolled component is closer to Group II.

These sites may also be reasonably grouped with Roe's Group I, although many of them fall well outside of the original morphometric region of Roe's original group in terms of average elongation. Hillingdon is intermediate between the broader and narrower clusters. This leaves the various Wolvercote samples from the point dominated group. Interestingly, none of the Wolvercote data presented here greatly resembled Roe's original analysis of Wolvercote, which showed an exaggerated preference for extremely narrow pointed types. Here, a much wider range of elongation values is evident. Wolvercote cannot be grouped at this stage; the unique technological characteristics of the Wolvercote handaxe assemblage are an important consideration and will be discussed below.

The rest of the sites in this study were pointed (uncommitted), except for Lent Rise and Woodgreen which were uncommitted, Bemerton which was ovate (uncommitted), and Broom which was ovate (dominant). In Roe's original methodology, an uncommitted site would be sorted into either the pointed (uncommitted) or ovate (uncommitted) category based on its mean average planform value. The Lent Rise assemblage analysed here has a planform index value of 0.36, which would normally indicate an ovate (uncommitted) industry. However, because the fraction of cleavers in the Lent Rise sample was unusually high (10.19%), which inflated the average planform index, the site was included in the pointed (uncommitted) group in this analysis. There is some precedent for doing so, as Roe encountered the same issue with Baker's Farm and Stoke Newington in his original analysis. Broom was included on the 'uncommitted' sorting diagram; Roe's methodology arbitrarily defined an ovate dominant assemblage as one with greater than 60% ovates, but in practice ovate dominant sites always exceeded 65% (and often more) (Roe 1968a, Roe 1981). This suggests that Broom need not be compared to the 'genuinely' ovate dominated sites, especially as Roe (1968a) and subsequent analysts have commented on the diverse or 'mixed' character of the assemblage which includes a significant fraction of cleavers (Hosfield et al., 2013b; Shipton & White 2020).

Moving on to the uncommitted traditions, Roe's original study 'confidently' placed Cuxton, Whitlingham, Twydall, Stoke Newington and Baker's Farm with Furze Platt in Group I. These handaxes again showed a preference for narrow pointed forms including 'extreme' types such as ficrons, relatively narrow ovates, and a variable but significant proportion of transverse cleavers.

Few of the point (uncommitted) sites in this study can readily be grouped with Roe's Group I in its original sense; these are:

1. Cuxton
2. Ham Hill
3. *Whitlingham (White)*
4. *Milford Hill (Egberts)* – although note that this site sits slightly outside of the range of elongation/ tip shape values in Roe's original Group I.

Four of the remaining sites show clear affinities for Group I shape preferences, evident from their tripartite diagrams, but fall well outside the average elongation/ tip shape range of Roe's original Group I sites; these may be related to the previously identified broader sub-group:

1. Farnham C
2. Barnham Heath
3. Lent Rise
4. Stoke Newington
5. *Berinsfield (Lee)*
6. Lower Clapton. Another site reminiscent of Group I, although in this case lacking in 'extreme' pointed forms; the tripartite diagrams for this site suggest a similarity with the neighbouring site of Stoke Newington.
7. Aylesford. This site is intermediate between the broader and narrower cluster. There is the suggestion of distinct morphological characteristics based on condition, with lower elongation values (i.e., narrower handaxes) associated with more rolled condition - perhaps pointing to a mixed assemblage (c.f. Dunbridge).

Assemblages which were uncommitted or ovate (uncommitted) are shown above in figure 5.6. On examination of both tripartite diagrams and positioning on figure 5.6, the following sites may be confidently added to Roe's Group I.

1. Lent Rise

Roe identified further groupings within his ovate (uncommitted) section. Fordwich was assigned to Roe's Group V on the basis of the general 'roughness, narrowness, irregularity and tendency to heaviness' which he considered to be 'unmistakable'. Shide (Pan Farm) was found to be characterised by 'more pointed' ovate types, but completely lacking in 'extreme' pointed types such as ficrons. As such, Roe grouped Shide with his Group VI (ovate tradition, more pointed), although this attribution has been challenged by Emery (2010) who included the site in Roe's Group IV (generalised). Of the remaining sites, Roe identified a highly generalised group which combined both extreme pointed types and highly refined ovate types with characteristics similar to both Group II and Group VI, but not similar enough to justify inclusion in either. Roe placed his Broom, Santon Downham, Wallingford and Barton Cliff assemblages into this group, his Group IV. Due to the somewhat arbitrary conditions for inclusion – by its very definition as a 'generalised' group – confidently placing sites in the group is difficult. The following sites, however, can be said to share the same broad morphometric characteristics:

1. Bemerton (*Egberts*)
2. Woodgreen (*Egberts*)

Broom was not found to be closely similar to the other Group IV sites in purely metrical terms, although the handaxe assemblage could certainly be described as 'generalised'. Much like Wolvercote, the presence of distinct technological attributes at Broom (macroscopically asymmetrical 'lopsided' handaxes) mean that the site cannot confidently be assigned to a group at this stage:

1. Broom (*Hosfield et al. 2013b*)

A provisional table of morphometric groups is shown in table 5.4 below. Technological attributes (discussed below) factored into Roe's original grouping, but these attributes were generally used as corroborating rather than decisive evidence. Roe originally selected his sites based on the integrity and quality of the artefact assemblage: in his own words, 'reliable samples' were sought, at the exclusion of sites such as Dunbridge which he suspected were mixed. Quite the opposite approach was taken here – any site attributed to MIS 9, even with low confidence, and for which a sufficiently large handaxe assemblage was available was considered suitable for analysis. As such, closer examination will be necessary before confidently assigning sites to morphometric groups. This is discussed fully below.

Table 5.4. Provisional morphometric grouping of sites (sites in bold are those added by the present study).

Pointed tradition			Intermediate	Ovate tradition		
Group I (with cleavers)	Group II (with ovates)	Group III (plano-convex)	Group IV (generalised)	Group V (coarse, narrow, irregular)	Group VI (more pointed)	Group VII (less pointed)
Furze Platt	Swanscombe M.G.	Wolvercote	Broom	Fordwich	Elveden	Gaddesden Row
Baker's Farm	Chadwell St. Mary		Santon Downham	Farnham A	Allington Hill	High Lodge
Cuxton	Hoxne		Barton Cliff	Warren Hill (worn)	Caversham	Warren Hill (fresh)
Whitlingham	Dovercourt		Wallingford		Knowle Farm	Highlands Farm
Twydall	Hitchin		***Bemerton (Egberts)***		Bowman's Lodge	Croxley Green
Stoke Newington	Foxhall Road?		***Woodgreen (Egberts)***		Tilehurst	Corfe Mullen
Cookham					Shide (Pan Farm)	Caddington?
Thetford					Oldbury	
Ruscombe					Round Green?	
Warsash					Holybourne?	
Twydall					Swanscombe U.L.?	
Furze Platt						
Biddenham?						
Leyton?						
Hillingdon L.B.						
Iver?						
Keswick						
Kempston?						
Dunbridge?						
Baker's Farm						
Cuxton						
Stoke Newington?						
Farnham C						
Lent Rise						
Barnham Heath?						
Lower Clapton?						
Milford Hill (Egberts)						
Stanton Harcourt (Lee)						
Whitlingham (White)						
Berinsfield (Lee)			Uncertain attribution:			
Aylesford?			**Broom (Hosfield et al.)**			
Ham Hill (Snodland)			**Wolvercote (all analyses)**			
Bromham						

*Table 5.5. Technological attributes for Groups I, II and II from Roe (1968a) compared to those measured by the author (in bold). *incomplete data*

Group	Site	% Twisted Profile	% *Tranchet*
I	Furze Platt	0.4	5
	Baker's Farm	0	12
	Cuxton	0	8
	Whitlingham	0	25
	Twydall	0	10
	Stoke Newington	0	13
	Cookham	0	15.74
	Thetford	0*	10.17
	Ruscombe	1.12	7.87
	Warsash	2.02	20.95
	Twydall	0	17.5
	Furze Platt (CCF)	0.24	8.87
	Biddenham	0	8.33
	Leyton	4.17	10.96
	Hillingdon L.B.	2.02	9.09
	Iver	4.32	0
	Keswick	8.33	16.67
	Kempston	1.65	0
	Dunbridge	8.25	13.40
	Baker's Farm	0	13.33
	Cuxton	0	7.43
	Stoke Newington	2.59	7.33
	Farnham C	0	7.69
	Lent Rise	0	8.26
	Barnham Heath	0	15
	Lower Clapton	0	4.76
II	Swanscombe M.G.	0	3
	Chadwell St Mary	1	2
	Hoxne	3.5	13.5
	Dovercourt	4	6
	Hitchin	10	17.5
	Foxhall Road	15	27
III	Wolvercote	0	22
	Wolvercote	0	15.38

Roe's non-metrical attributes proved to be a poor way of determining between Groups I, II and III, with each group having a proportion of tranchet removals in the broad range of 0 – 25%. Twisting of the profile was certainly more common in Group II than Group I, but the range for Group II (0 – 15%) overlapped with that of Group I (0 – 0.4%). Roe's Group II included at least two sites (Hitchin and Foxhall Road) which may be mixed assemblages (M. White *pers. comm*., 15.12.2020); twisting of the profile was a far more common component of Roe's Group VI assemblages (Roe 1968a; White et al., 2019). The sites in the present study tend to fall into these broad ranges also, although relatively low numbers of twisted profiles were identified at sites otherwise robustly assigned to Group I. This may simply be a case of intrusive, derived material contaminating the sample, a product of the less particular criteria for site selection in this study compared to Roe's study – this is likely the case with Dunbridge, which had elevated numbers of twisted handaxes. Keswick too had higher than average proportions of twisted handaxes, although this is perhaps more a reflection of the small sample size than a genuine pattern.

5.1.3. MIS 9 morphometric group preferences: summary.

As outlined in **the previous chapter**, Roe's (1968a) handaxe groups have been shown to have chronological significance (Bridgland & White 2014, 2015; White 2015; White et al. 2018). Handaxe assemblages assigned to Roe's Group I and Group III have been strongly suggested to be characteristic of sites dated to MIS 10 – 8, although this has not previously been rigorously tested on a large number of age-relevant sites.

The preliminary morphometric sorting of sites presented here supports the suggested chronological patterning of MIS 10 – 8 handaxes, although perhaps not as strongly as may have been expected. Of the 31 sites assessed according to Roe's methodology, 14 could be sorted with reasonable confidence into Roe's Group I based on similarities to the sites in his original study. Eight sites showed many of the characteristics of Group I but were generally broader on average, outside of the morphometric 'bounds' of Roe's original group. Four sites were good fits for Group I but were somewhat intermediate between the narrower and broader sub-groups. One site (Dunbridge) is suggested to be a mixed assemblage, perhaps including handaxes with both Group I and Group II affinity. Two sites were found to align most closely with Roe's Group IV. Broom (Hosfield et al. 2013) was not found to align closely to any previously established morphometric group, although it had a closer affinity to Group IV than any other group.

This study, White (*pers. comm.*) and Lee (2001) found Wolvercote to be less demonstrably distinct from the other groups in purely morphometric terms than in Roe's (1968a) study, where it was the only site in Roe's Group III. Nevertheless, the apparently unique abundance of finely made, narrow plano-convex handaxes probably justifies its continued treatment as a separate group for now – the relationship between Wolvercote and the wider Group I culture **will be discussed fully in the following chapters**.

5.1.4 Further sorting.

Roe (1968a) was able to identify sub-groups in his Groups II and VI, based on subtly different sets of morphological and technological characteristics within a broader 'umbrella' of shared characteristics. No sub-group within Group I was identified by Roe, possibly due to the small number of sites in the original group, although his Cuxton, Twydall and Whitlingham samples could certainly be argued to form a reasonably tight cluster on the pointed (uncommitted) graph.

The additions to Group I made by this study offer the opportunity to identify metrically defined sub-groups. The validity of these groups will be explored in the following chapters but first impressions based purely on morphometric characteristics may be made here.

In the point dominated section, the overall impression is of a much wider inter-site variation in elongation than Roe had originally identified, coupled with more moderate inter-site variation in tip-shape. Two sub-groups may be tentatively suggested, one with relatively narrow mean elongation values and one with relatively broad elongation values.

In the pointed (dominant) assemblages, the narrow sub-group is most similar to Roe's original Group I, and consists of:

1. Ruscombe
2. Furze Platt
3. Baker's Farm
4. Warsash
5. Cookham
6. Bromham
7. Canterbury West
8. (Keswick)
9. (Thetford)
10. (Twydall)

Keswick, Thetford and Twydall may be considered marginal to this group. Roe's (1968a) Furze Platt sample also aligns closely with the 'narrow' sub-group.

The broad sub-group consists of:

1. Leyton

2. Kempston
3. Iver
4. Biddenham (although this is slightly marginal to the main grouping)

Hillingdon (L.B.) is intermediate between the two sub-groups. Dunbridge is likely to represent a mixed assemblage.

In the pointed (uncommitted) category, the following sites may be added to the narrow sub-group:

1. Cuxton
2. Lent Rise
3. Ham Hill
4. Whitlingham (*White*)

Milford Hill (*Egberts*) is intermediate between the two sub-groups.

This cluster notably overlaps with Roe's group of Cuxton, Twydall and Whitlingham.

The following sites may be added to the broad sub-group:

1. Lower Clapton
2. Stoke Newington
3. Stanton Harcourt (*Lee*)
4. Berinsfield (*Lee*)

Aylesford is intermediate between the two sub-groups.

The sites of Farnham C and Barnham Heath do not group closely with any other sites, although they are certainly characterised by broadness rather than narrowness. It might also be noted here that Roe's Group IV presents some similarities to Group I (especially in the presence of 'extreme' pointed types and cleavers).

The sub-groups of assemblages with Group I affinity are shown below in table 5.6.

Table 5.6. Suggested morphometric sub-groups with Group I, based on variations in elongation.

Group I (Roe 1968a)		
Group IA (narrower, larger)	**Group IB (broader, smaller)**	**Group I (uncertain/ intermediate)**
Furze Platt	Leyton	Hillingdon (L.B.)
Ruscombe	Kempston	Milford Hill
Cookham	Iver	(Dunbridge)
Baker's Farm	Biddenham	(Farnham C)

Warsash Bromham Canterbury West Cuxton Lent Rise Ham Hill Whitlingham (Keswick) (Thetford) (Twydall)	Stoke Newington Lower Clapton Stanton Harcourt Berinsfield	(Barnham Heath)

The suggestion of geographical patterning in these results – notably, the prevalence of narrow types in the Middle Thames, broad types in the Lower Thames (around London), and Group IV handaxes in the extreme western margin of the MIS 9 Acheulean in Europe, will be discussed fully in the following chapters.

5.2. Typology.

Typological charts are presented site-by-site in Appendix III. The charts paint a clear picture of some of the larger scale typological preferences for the supposed MIS 9 sites included in this study. There is a strong preference in most assemblages for type F (pointed) handaxes, in accordance with the metrical preference for pointed types established in the morphometric analysis. Crude types are common across most sites, although with a high degree of variability; type E (small, pointed, crude) types are generally more common than type D (large, pointed, crude) types. Type H (cleavers) and type G (sub-cordate) types tend to occur in moderate proportions at most sites; type K (ovates) and type J (cordates) are generally uncommon, and type N (*bout-coupe*) are almost entirely absent. Type M (ficrons) and type FM (demi-ficrons) are generally uncommon, both within the MIS 9 assemblages assessed here and in the wider British Acheulean record but occur at all sites except for Lower Clapton in some proportion.

The typological analysis for Dunbridge strongly supports the interpretation of the assemblage as being mixed, with a clear preference for ovate-cordate types in the more-rolled condition categories, combined with pointed types and cleavers in large numbers in less-rolled condition. A similar, although slightly less pronounced trend is also evident in the typological analyses from Warsash and Aylesford.

Several of the sites in the newly suggested sub-group IB (Stoke Newington, Lower Clapton, Leyton and Iver) show a preference for small, crude (type E) handaxes over pointed (type F) handaxes, although this pattern is less evident in the Great Ouse sites (Kempston and Biddenham).

Typology will be assessed and compared by geographic area in the following chapter. The picture presented by the ‘top-level’ comparison of typology is one of pronounced variability in the proportions and range of types represented regardless of geographic proximity, with a few notable exceptions.

5.3. Condition.

Table 5.7 Percentages of each site's sample in each of the four condition categories. The largest fraction of the sample is highlighted in dark blue; the second largest in light blue.

	Very fresh	Slightly Rolled	Rolled	Very Rolled
Aylesford	0.00	14.94	36.78	48.28
Baker's Farm	23.33	70.00	6.67	0.00
Barnham Heath	8.75	26.25	35.00	30.00
Biddenham	9.26	37.04	32.41	21.30
Bromham	0.00	16.00	56.00	28.00
Canterbury West	5.88	41.18	47.06	5.88
Cookham	33.64	32.71	19.63	14.02
Cuxton	48.57	46.29	5.14	0.00
Dunbridge	8.25	19.59	18.56	53.61
Farnham C	19.23	26.92	34.62	19.23
Furze Platt	17.45	45.86	30.65	6.04
Ham Hill (Snodland)	5.26	42.11	42.11	10.53
Hillingdon	14.14	19.19	21.21	45.45
Iver	0.72	5.76	25.90	67.63
Kempston	2.50	19.17	37.50	40.83
Keswick	4.17	66.67	25.00	4.17
Leyton	6.94	25.00	25.00	43.06
Lent Rise	20.56	44.86	18.69	15.89
Lower Clapton	4.76	19.05	38.10	38.10
Ruscombe	10.23	35.23	40.91	13.64
Stoke Newington	33.62	31.47	18.97	15.95
Thetford	5.08	18.64	42.37	33.90
Twydall	35.00	52.50	7.50	5.00
Warsash	6.76	25.68	37.84	29.73
Wolvercote	35.90	48.72	5.13	10.26

The per-centage of each condition category in each individual assemblage is shown in table 5.7**,** above. There is a clear picture of both inter- and intra- site variation in condition, with almost every site having at least some handaxes falling into each of the four condition categories. That said, many of the sites show some 'skew', either towards more or less rolled handaxes. This is illustrated by the shading in table 5.7.**,** which shows the most prevalent and second most prevalent condition category for each site. The sites may be sorted by condition as follows:

Sites with a clear 'skew' towards fresher condition:

1. Baker's Farm
2. Cookham
3. Cuxton
4. Lent Rise
5. Stoke Newington
6. Twydall
7. Wolvercote

Sites with a clear 'skew' towards more rolled condition:

1. Aylesford
2. Barnham Heath
3. Bromham
4. Hillingdon L.B.
5. Iver
6. Kempston
7. Leyton
8. Lower Clapton
9. Thetford
10. Warsash

Sites which are 'uncommitted' in terms of condition:

1. Biddenham
2. Canterbury West
3. Farnham C
4. Furze Platt (CCF)
5. Ham Hill (Snodland)
6. Keswick

7. Ruscombe

Only one site could be considered to have a bimodal distribution of condition categories (although on average it is still skewed towards more rolled condition states):

1. Dunbridge

5.4. Technology – proxies for reduction intensity.

Table 5.8. shows technological attributes, which together can be used to approximate reduction intensity in various ways. Note that these data were not recorded for Aylesford, Bromham or Ham Hill (Snodland).

Table 5.8. Proxies for reduction intensity.

Site	Scar count	Scar density (Scar count/ L)	Cortex %	Fully worked butt %	Flake Blank %
Baker's Farm	48.83*	0.35	14.29	46.67	6.67
Barnham Heath	28.73	0.23	15	56.25	8.75
Biddenham	35.73	0.31	16.02	49.07	1.85
Canterbury West	34.65	0.23	4.12	64.71	11.76
Cookham	32.22	0.29	13.80	43.52	8.33
Cuxton	35.91	0.29	19.69	33.14	7.43
Dunbridge	38.13	0.34	10.98	52.58	6.19
Farnham C	30.88	0.28	15.77	50	3.85
Furze Platt	35.80	0.29	14.62	41.73	3.84
Hillingdon L.B.	45.14	0.38	8.69	60.61	2.02
Iver	x	x	25.07	58.27	1.44
Kempston	28.12	0.28	13.25	52.89	9.09
Keswick	59.13	0.39	4.79	62.5	8.33
Leyton	29.18	0.27	10.76	61.64	5.56
Lent Rise	28.21	0.26	18.61	40.74	3.67
Lower Clapton	41.24	0.41	11.19	57.14	0
Ruscombe	36.63	0.28	14.38	48.31	3.37
Stoke Newington	38.30	0.42	17.05	45.26	7.33
Thetford	34.69	0.27	8.56	71.19	11.86
Twydall	30.18	0.25	11.38	57.5	22.5
Warsash	36.95	0.27	13.07	58.11	10.14
Wolvercote	39.31	0.35	9.23	53.85	23.08

Comparable flake scar density data are available in White (1998b), who found that sites assigned to Roe's Group I had generally low scar densities. These were Furze Platt (0.294), Whitlingham (0.322) and Stoke Newington (0.395). Wolvercote had a scar density of 0.425. The sites assessed here and tentatively assigned to Group I generally also show low flake scar densities, in the range 0.23 (Barnham Heath) to 0.42 (Stoke Newington). In this study, Wolvercote was found to have a flake scar density of 0.35.

Similarly, the Group I sites in White (1998b) have moderately high retention of cortex, including Whitlingham (11.5%), Furze Platt (13.5%) and Stoke Newington (18.5%). This range is certainly comparable to the spread of retained cortex values shown in table 5.8, with a handful of prominent exceptions (Wolvercote, Keswick, Hillingdon and Thetford have notably lower cortex retention; Iver is somewhat higher).

It may be suggested that fully worked butts are common but not ubiquitous at most sites in this study. In this, the results here differ from similar measurements presented in White (1998b), which showed a range of 27 – 32% fully worked butts for Group I sites. This is lower even than the lowest percentage of fully worked butts in this study, at Cuxton (33.14%). The reason for this discrepancy is not immediately apparent, although inter-analyst variation is a possibility given the subjectivity of what constitutes 'fully worked'.

5.5. Symmetry.

Figure 5.7 shows the results of FlipTest symmetry analysis on selected sites in the present study for which symmetry data were generated.

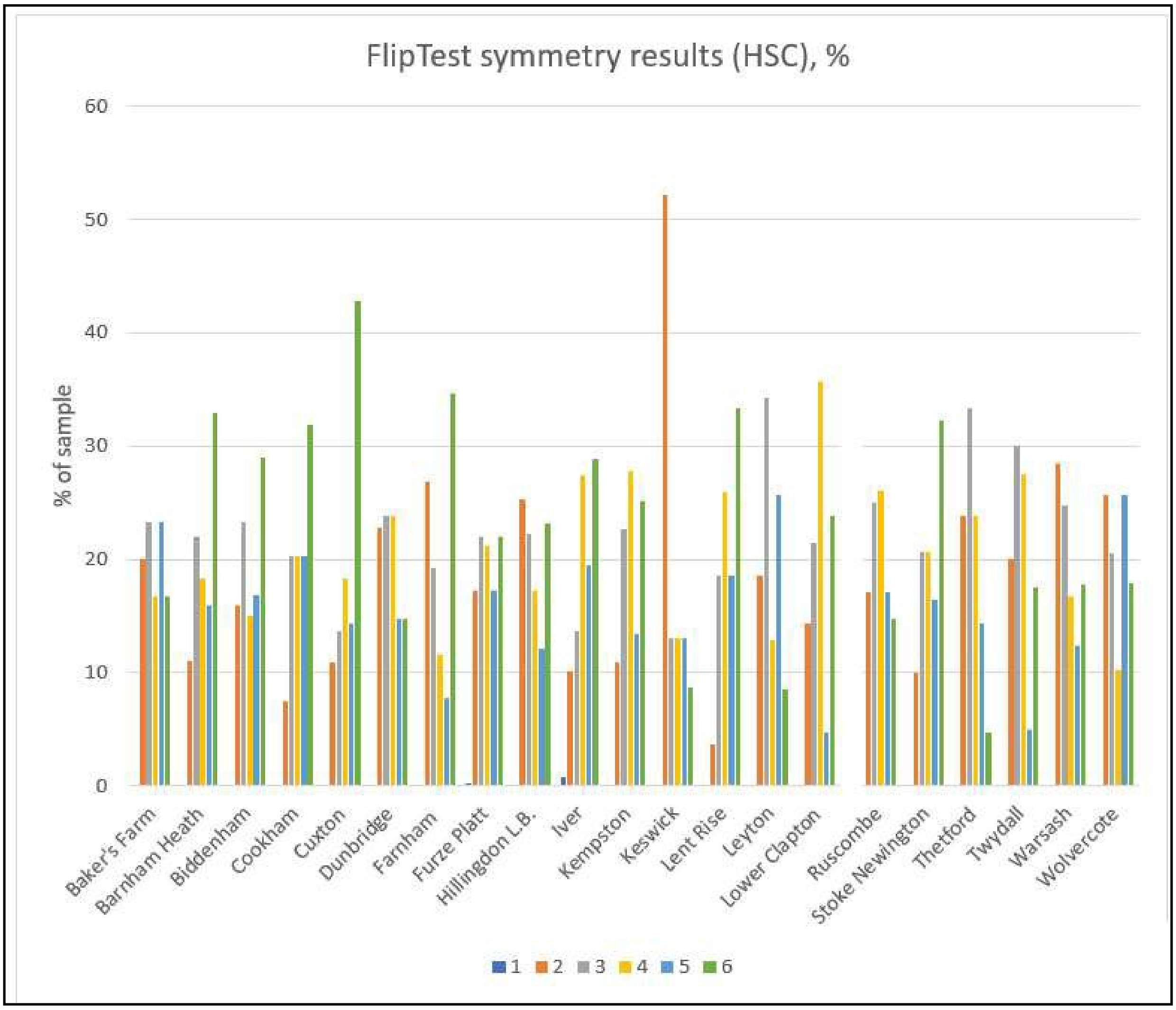


Figure 5.7. FlipTest symmetry data. The numbered key shows Handaxe Symmetry Classes (HSC), 1 being most symmetrical and 6 being the most asymmetrical (thus Keswick has a very high proportion of highly symmetrical handaxes, whilst Cuxton has a high proportion of asymmetrical handaxes).

Figure 5.8 is the same data, with handaxes judged to be of 'crude' type (i.e., types D, DF, DK E, EF) removed from the analysis. This was an effort to mitigate against the possible effects of collectors' bias, which may have reduced the proportion of small, crude handaxes at some sites.

There are no clear patterns between sites in terms of handaxe symmetry; all sites are characterised by a high diversity in symmetry, in accordance with White & Foulds' (2018) analysis of the symmetry of Group I sites. The importance of handaxe symmetry will be fully discussed in the following chapters.

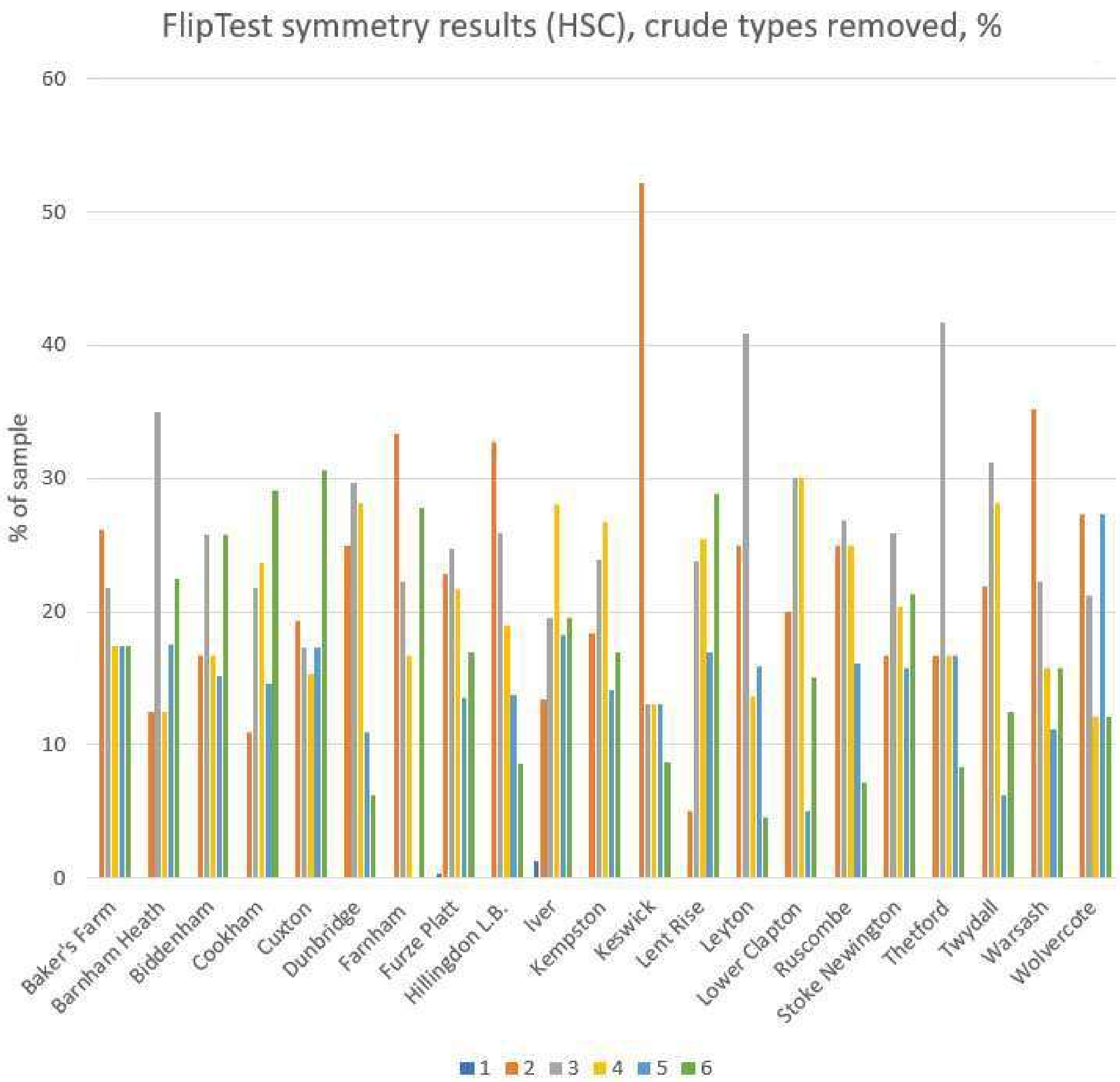


Figure 5.8. FlipTest symmetry data, with 'crude' types removed. The numbered key shows HSC's.

Table 5.9 summarises the prevalence of 'attributes of asymmetry' (as outlined in the methodology, chapter four) present at each site. Note that these data were not recorded for Aylesford, Bromham or Ham Hill (Snodland).

Table 5.9. Attributes of asymmetry, as a per-centage of the total sample. Where an attribute occurred in more than 20% of the sample, the cell is shaded deep blue; where it exceeded 15%, the cell is shaded medium blue; where it exceeded 10% the cell is shaded light blue.

SITE	n.	Lopsided	Plano – convex profile	Biconcave planform	Demificron	Grip (cortical backing)	Notched	*Méplat* (oblique backing)	Broken
Baker's Farm	*32*	9.4	12.5	12.5	18.8	15.6	6.3	6.3	*6.3*
Bar. H.	*36*	22.2	0.0	2.8	2.8	41.7	2.8	2.8	*0.0*

Biddenham	*119*	4.2	5.9	3.4	7.6	10.1	3.4	9.2	*9.2*
Cookham	*109*	9.2	9.2	7.3	7.3	7.3	2.8	3.7	*13.8*
Cuxton	*197*	4.6	7.6	9.1	7.6	20.8	2.5	8.6	*11.2*
Dunbridge	*91*	4.4	8.8	4.4	9.9	6.6	0.0	5.5	*6.6*
Farnham	*27*	3.7	7.4	3.7	0.0	7.4	0.0	0.0	*3.7*
Furze Platt	*501*	8.2	8.8	9.2	10.2	9.4	2.0	10.6	*6.0*
Hillingdon	*107*	2.8	6.5	3.7	7.5	3.7	2.8	0.0	*7.5*
Iver	*139*	18.7	10.8	3.6	10.1	6.5	9.4	2.2	*0.0*
Kempston	*156*	6.4	6.4	6.4	5.8	6.4	2.6	3.8	*21.8*
Keswick	*25*	4.0	8.0	8.0	4.0	0.0	0.0	4.0	*4.0*
Lent Rise	*126*	15.9	4.8	5.6	7.1	21.4	4.0	5.6	*14.3*
Leyton	*75*	8.0	2.7	6.7	6.7	2.7	9.3	4.0	*4.0*
Lower Clapton	*51*	3.9	5.9	5.9	5.9	7.8	2.0	2.0	*17.6*
Ruscombe	*110*	0.0	6.4	6.4	6.4	3.6	0.9	6.4	*6.4*
St. New.	*271*	17.0	10.0	7.4	3.3	12.5	8.5	10.7	*14.4*
Thetford	*25*	4.0	16.0	12.0	0.0	0.0	0.0	8.0	*16.0*
Twydall	*44*	11.4	18.2	4.5	9.1	11.4	2.3	9.1	*9.1*
Warsash	*156*	4.5	2.6	8.3	1.3	4.5	1.9	0.6	*5.1*
Wolvercote	*41*	24.4	26.8	0.0	0.0	7.3	9.8	4.9	*4.9*

The attributes show few easily identifiable patterns. There are a handful of exceptions to this: profile plano-convexity was a very frequent occurrence at Wolvercote, and a common occurrence at Stoke Newington, Lent Rise, Iver and Barnham Heath. Macroscopic asymmetry in planform (lopsided or demificron handaxes) was a significant feature at Wolvercote, Twydall, Thetford and Baker's Farm. Handaxes with retained cortex which could conceivably have functioned as an ergonomic 'grip' were found to be a significant feature of the assemblages at Barnham Heath, Cuxton and Lent Rise.

5.6. Assessing the agreement between Wymer and Roe.

The degree of overlap between Roe's metrical planform shapes and Wymer's types is an important consideration when interpreting the tripartite diagrams and primary metrical sorting shown above (Roe 1968a; Wymer 1968). Roe's metrical planform shapes are based solely on planform index values; the difference between a metrical point with a planform value of 0.34 and a metrical ovate with a planform value of 0.35 might not produce a visibly different shape at all, and both tools could well belong to the same type. This problem was highlighted by both White (2006) and Emery (2010) and is worth exploring further.

The data presented in the graphs below show the typological makeup of the metrically pointed, ovate and cleaver fractions of the whole sample from the present study (Roe 1968a; Wymer 1968, 1985; figure 5.9 – 5.11).

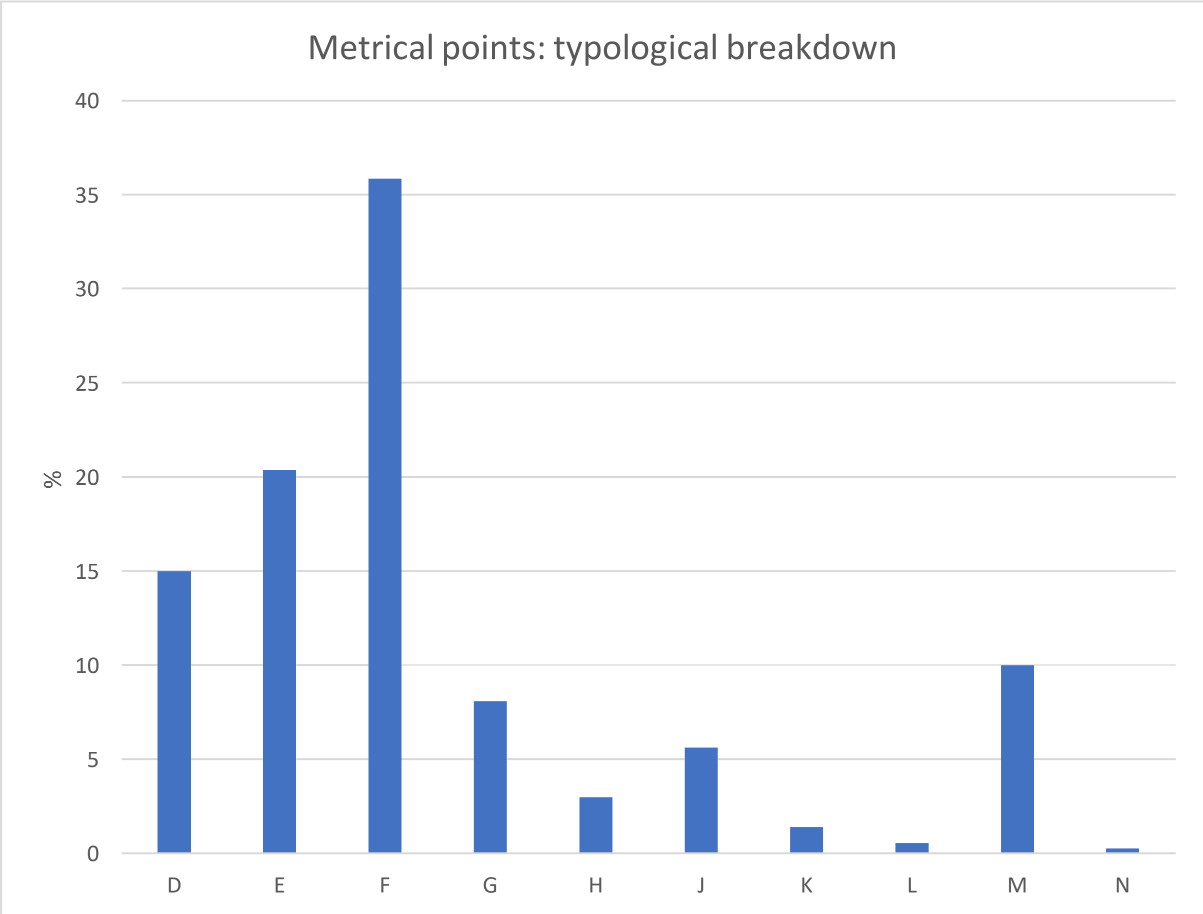


Figure 5.9. A graph to show the degree of agreement between handaxes judged to be metrically pointed using Roe's morphometric methodology (Roe 1968a), and Wymer's typology (Wymer 1968, 1985).

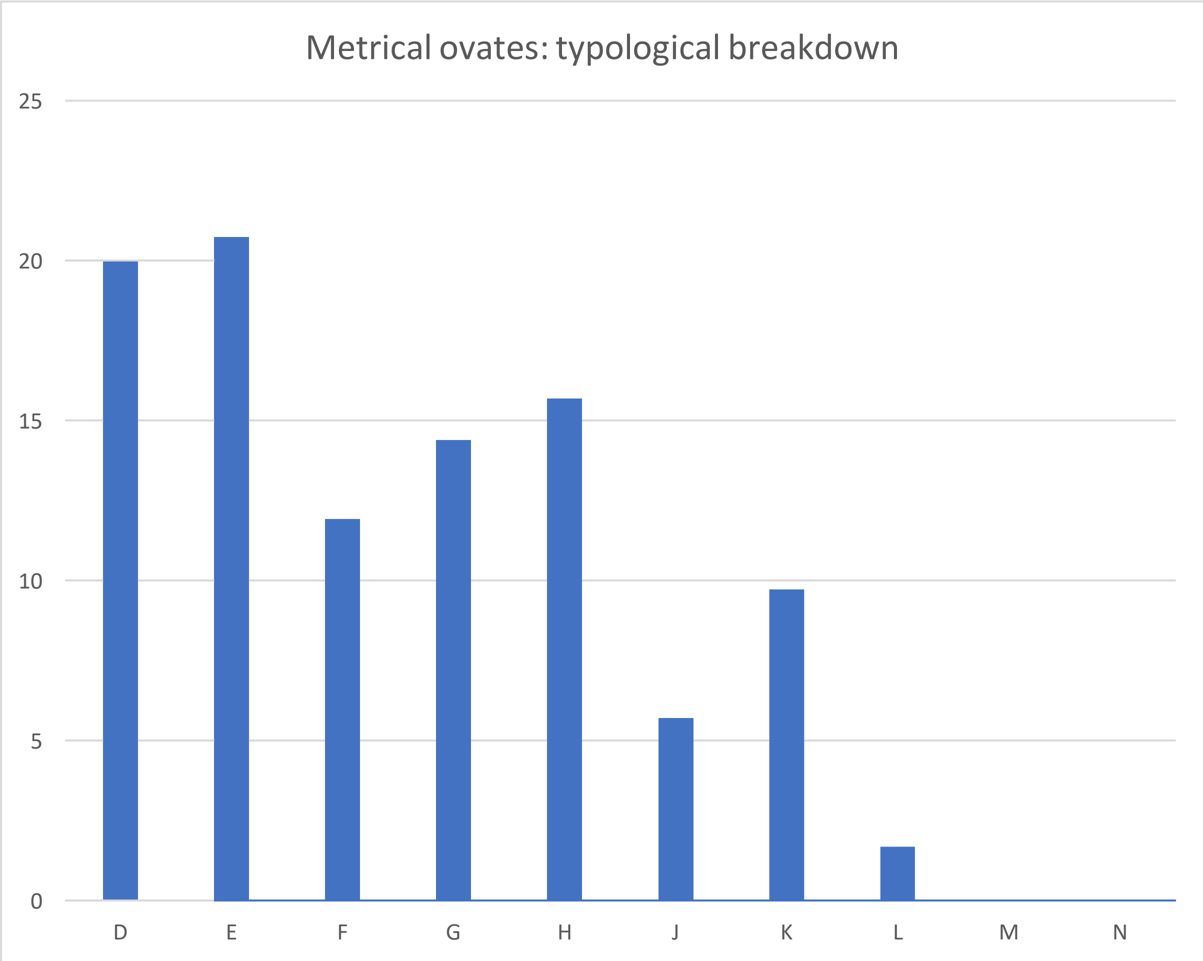


Figure 5.10. A graph to show the degree of agreement between handaxes judged to be metrical ovates using Roe's morphometric methodology (Roe 1968a), and Wymer's typology (Wymer 1968, 1985).

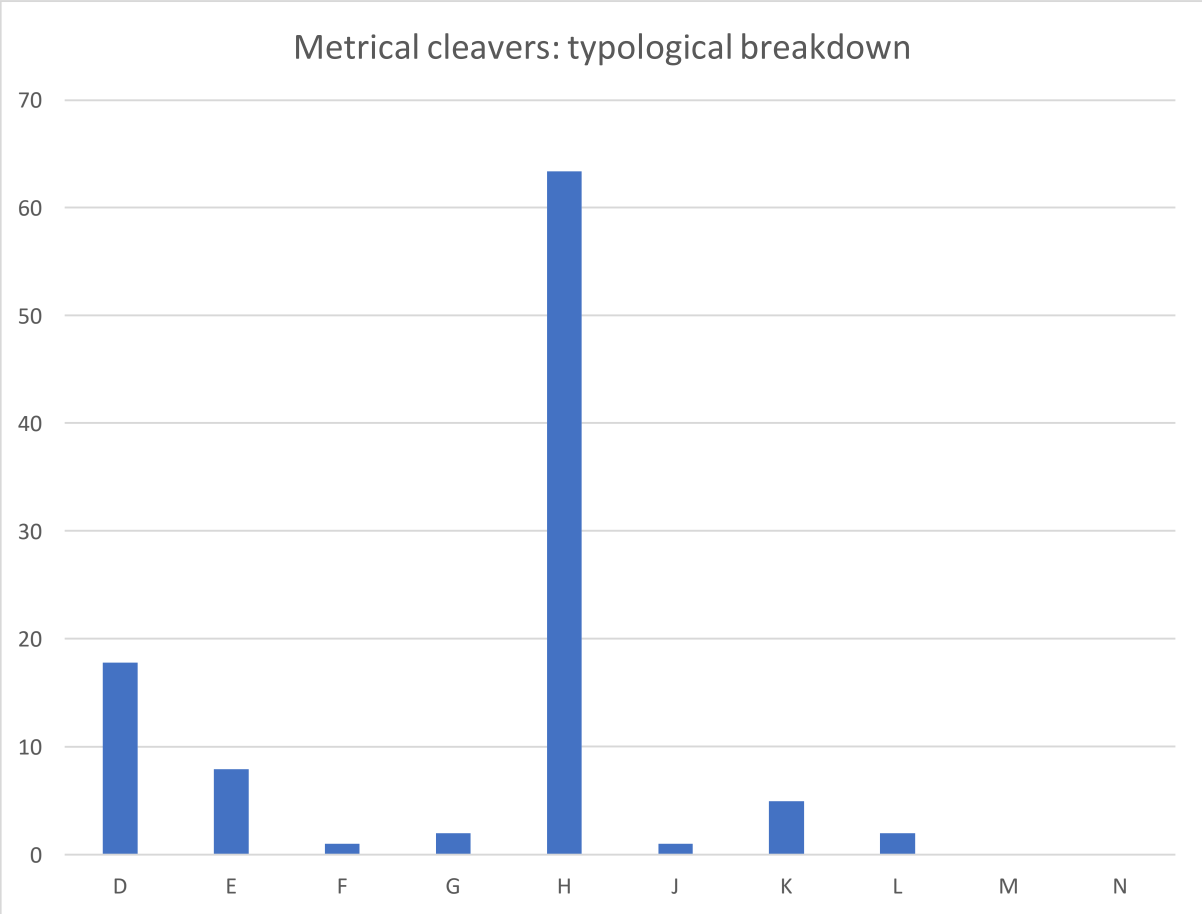


Figure 5.11. A graph to show the degree of agreement between handaxes judged to be metrical cleavers using Roe's morphometric methodology (Roe 1968a), and Wymer's typology (Wymer 1968, 1985).

The analyses presented above suggest a strong overlap between metrical and typological cleavers, with 63.37% of the metrical cleavers also being typological cleavers (type H and variants). Most of the remaining metrical cleavers are crude types (where irregularity of shape may have resulted in maximum width being unintentionally produced towards the top of the tool), along with a handful of wide-ended ovates. Metrically pointed handaxes are most likely to be typological points (type F and variants, 35.83% overlap) but with a strong representation of crude types and ficrons. In contrast, metrically ovate types were most likely to be crude (type D, E and variants 40.68% overlap), followed by a wide spread of other types in approximately equal proportions. Tellingly, a metrical 'ovate' was more likely to be a typological point or typological cleaver than a typological ovate, a testament to the rarity of refined ovates in MIS 9 assemblages. This suggests that Roe's divisions were quite successful in capturing a cleaver or a pointed type. The relatively small number of typological ovates in MIS 9 assemblages makes it difficult to suggest how suitable Roe's division between points and ovates is in assessing assemblages with larger numbers of typological ovates and cordates, although Roe's metrical ovate section did succeed in capturing the majority of typological ovates in the studied assemblages. In summation, Roe's planform shape divisions may have been somewhat arbitrary, but were based on his own extensive observations of handaxes and as such were able to successfully capture 'real world' shapes in the form of the planform index value.

This has some bearing on the interpretation of the tripartite diagrams (which might be more properly divided into 'pointed', '*crude*' and 'cleaver' based on the analysis above), and on the primary sorting process. The variations in the proportion of metrical points, ovates and cleavers between sites may be less important than other metrical factors in assessing inter-site variability (Roe 1968a; Emery 2010).

5.7. Summary.

The morphometric data presented here mostly show some similarity to Roe's Group I, consistent with expectations for MIS 9 handaxe sites according to the chronological patterning studies of White and Bridgland (e.g., Bridgland & White 2014, 2015; White et al. 2018), although a much wider range of shapes (particularly in terms of elongation) were identified. A handful of sites in the Solent appear more 'generalised' in morphometric terms, closer in character to Roe's Group IV. The position of Wolvercote and Broom is unclear and warrants further examination. It is now possible, for the first time, to suggest two subtly distinct sub-groups within Group I – Group IA and IB. Group IA is reminiscent of Roe's Furze Platt sample; narrow pointed handaxes were more common, along with ficrons and cleavers. Group IB is reminiscent of Roe's Stoke Newington sample; broader, small and crude handaxes characterise this sub-group, although pointed handaxes are also common, and ficrons and cleavers are also co-occurring. Attributes of reduction intensity showed few identifiable patterns but were generally found to occur within the expected ranges, consistent with Roe's Group I based on comparison with previously published data (White 1998b). The following chapter will interpret these data, combined with an in-depth analysis of contextual data and previously published studies, at a regional level.

Chapter Six: Spatial Patterning.

6.1. Introduction.

The following section will consider the data presented in the previous chapter through the lens of spatial (geographical) patterning. First, previously identified examples of geographical patterning, both in Britain and internationally, will be outlined. Then each region will be examined, drawing together the data presented in the present study and previously published accounts of other chronologically relevant sites. Particular attention will be paid to the possibility of patterning in morphology and typology according to geographical area.

6.2. Scales of spatial patterning.

The Acheulean has been described as a techno-complex of remarkable uniformity and conservativism over its wide geographical and temporal range (e.g., Tattersall et al. 1988; Klein 1989; Phillipson 1994), which stands in contrast to the range of environments the Acheulean hominins colonised, and to the biological and evolutionary changes in those hominins over the same period (Phillipson 1994; Vaughan 2001). That said, geographical variation in handaxe technology on the largest scale has a relatively long history of research, beginning with the identification of the near absence of bifacial technology to the east of the 'Movius Line' (Movius 1948, 1956, 1969), although Movius himself noted the different trajectories and speeds of research into the Middle Pleistocene on either side of the 'Movius Line' might have accounted for some of the apparent differences in archaeology (Movius 1978), and current thinking on the occurrence of handaxes in eastern Asia would suggest that the demarcation between the handaxe-making west and the handaxe-lacking east is more nebulous than Movius had originally suggested (Norton et al., 2006; Norton & Bae 2008; Lycett & Norton 2010; Dennell 2016). Further geographical variation at the inter-continental scale was identified by Wynn & Tierson (1990), who compared handaxe shapes from sites in Africa, Israel, Europe and India. They found that inter-regional variation did occur, although their statistical analysis was only reliably able to discriminate Israeli handaxes from the other regions. Perhaps tellingly, they found the highest degree of inter-site variation occurred between British sites – this was presumably a consequence of the sites selected for their study, which ranged in age from MIS 9 to MIS 15, thereby subsuming all of Roe's morphometric groups. At the inter-regional scale, Bordes (1966) identified an *Acheuléen Meridional* tradition confined to southern France and Spain, and an *Acheuléen Septrional* tradition considered to represent the 'classic' handaxes of northern France (Mourre & Colonge 2007; Ashton et al. 2016). There may also have been a chronological element to this patterning, with handaxes of the less symmetrical, irregular *Acheuléen Meridional* only appearing around MIS 10/9 (Delpech et al., 1995; Turq et al., 2010; Connet et al., 2020). A non-handaxe tradition, confined to Brittany in north-western France, was also identified (Molines et al., 2005). However, the geographical distribution of these variations may not be entirely cultural; differences in raw material, site function and the use of caves versus open-air sites have all been suggested as alternative sources of the observed variation (Villa, 1991; Moncel et al., 2015).

The identification of fine-grained (regional or sub-regional) variation has proved more problematic. Nevertheless, several recent studies have presented convincing evidence of regional cultural groups in Europe. In Italy, Moncel et al., (2020a) presented a comparative analysis of six sites in the Frosinone-Ceprano basin. These sites were dated using a range of absolute dating methods ($_{40}$Ar/$_{39}$Ar, U-series and ESR) and were found to have formed in the MIS 11 – 10 transitional period (410 – 350 kya.). They pointed to shared technological features including plano-convex handaxes, 'backed' bifaces and asymmetrical handaxes, as evidence of a long-lasting (c.60ky.) regional culture in central Italy, perhaps maintained as a network of interconnected occupation sites. They further noted similar technology in handaxes at the Italian sites of Torre in Pietra (MIS 10/9) (Villa et al., 2016), and La Polledrara di Cecanibbio (MIS 9) (Pereira et al., 2017), suggesting both a wider geographical distribution of the putative Frosinone-Ceprano culture, and a longer temporal span (c. 100ka.). The presence of several Levallois-like artefacts from the Italian peninsula in the MIS 11 – 9 period (Peretto et al., 2016; Moncel et al., 2016, 2020a; Pereira et al., 2018), led Moncel et al., (2020a) to suggest a 'long transition phase' between the Lower and Middle Palaeolithic in that region. The intriguing parallels with the British MIS 9 record, particularly in the distinctive technological features applied to these Italian handaxes, will be discussed fully below. In south-western Europe, the Iberian handaxe industries of the later Middle Pleistocene (MIS 11 – 6) resemble the African Large Flake Acheulean (LFA), with assemblages typically including large flake cleavers which are generally rare in European contexts outside of the Iberian Peninsula. Méndez-Quintas et al., (2020) emphasised the regional patterning of the LFA in southwestern Europe in contrast to its absence from more northern assemblages.

In Britain, White et al. (2019) identified regional scale cultural groups in their study on the occurrence of twisted ovate handaxes in southern Britain. The twisted ovate is strongly associated with deposits of MIS 11 age (e.g., White 1998a; Bridgland & White 2014, 2015; White & Bridgland 2018; White et al. 2019). The 60,000-year long MIS 11 cycle included two warm peaks (MIS 11c and MIS 11a) separated by a cold trough (MIS 11b) (Tzedakis et al., 2001; Ashton et al., 2008). In marked contrast to MIS 9 sites, a wide range of MIS 11 sites in the east of England can be dated to a specific MI sub-stage based on palynological, biostratigraphic and lithostratigraphic correlation with key sites which archive environmental evidence from large parts of the interglacial (particularly Swanscombe (e.g., Conway et al., (1977); White et al. (2013)), Hoxne (West & McBurney 1955; Wymer et al., 1993;

Ashton et al., 2008) and Barnham East Farm (Ashton et al., 1994a, 1994b, 1998, 2016; Preece & Penkman 2005)). White et al. (2019) demonstrated that twisted ovate-dominated handaxe assemblages occurred in East Anglia in MIS 11c, then reappeared south of the Thames in MIS 11a. The reappearance of twisted ovate-dominated assemblages in MIS 11a may suggest the autochthonous survival of populations in southern Britain during the MIS 11b interstadial (White et al. 2019), a pointreturned to below.

White et al. (2019) noted that the greatest distance between two of the MIS 11c twisted ovate sites (Hitchin and Ipswich) was 98km, and that all the East Anglian MIS 11c sites could be placed within a circle of 100km diameter. They noted that this area is around 50% larger than the Lower Palaeolithic 'local hominin network' range suggested by Gamble (1999, 2002), but suggested that this was due to Gamble's under-estimation of hominin ranges due to a reliance on the evidence provided by material transfer distances. The idea of large, river basin -centric 'ranges' is discussed further in Ashton & Davis (2021), who suggested that the distribution of East Anglian and Thames Valley sites represented home ranges for distinct hominin cultural groups. The areas represented (2500 km^2 and respectively 1300 km^2) could support biologically viable hunter-gatherer populations (175 individuals or more) based on ethnographic analogy with modern hunter-gatherer populations in northern latitudes (Wobst 1974; Binford 2001; Ashton & Davis 2021).

The identification of regional (~100 km) scale variation in handaxe morphology in MIS 11 means that the same scale of variation might be expected in handaxe assemblages from MIS 9, although there are caveats to this expectation. Firstly, the recognition of regional 'signatures' within secondary aggradations may pose a problem in terms of *chronological* resolution. Regional variation was only identified in MIS 11 due to the sub-MIS correlation of archaeological sites with combined archaeological-environmental sites such as Swanscombe and Hoxne, which provided an exceptionally long sedimentary record recording an environmental and archaeological framework for the majority of the interglacial. Only Purfleet provides a comparable record for the MIS 9 interglacial, and its handaxe assemblage is too small to allow meaningful morphometric or typological analysis (Wymer 1968; Bridgland et al., 2013). Consequently, regional signatures may only be apparent where the culture was long-lasting, relatively unchanging, and geographically static; this is discussed fully below. Secondly, MIS 9 lasted only 27ka, making it a relatively short temperate period compared to the bracketing interglacials of MIS 11 (c. 62ka) and MIS 7 (c. 56ka) (Siddall et al. 2003; Scott and Ashton, 2010). The warmest peak, generally agreed to be the initial substage MIS 9e, endured less than 4ka. Consequently, there may have been less time for regional patterns to become established, or perhaps less time for regional cultures to diversify from an initial colonising population. Finally, some regions have only a small number of sites which limits the probability of a pattern being established: the Great Ouse, for example, has only three sites very tentatively dated to MIS 9.

6.3. Regional breakdown of results.

The following section uses either river catchments (e.g., the Great Ouse) or interconnected river systems (e.g., the Solent, or East Anglia comprising of rivers discharging into the Wash) as the basic unit to define a hypothetical range. The Thames is split, following convention, into Lower, Middle and Upper sub-basins (e.g., Bridgland 1994; Bowen 1999; Lewis et al., 2004). The Lower Thames stretches from central London to the Thames estuary; the Middle Thames from the central London to the Goring Gap; the Upper Thames from the Goring Gap to the source (Lewis et al., 2004). These divisions are not entirely arbitrary - they can be related to various reaches of the Thames where similar hydrological conditions prevail (see figure 6.1.) – but for the sake of clarity, the whole of the urban area of London is included with the Lower Thames in the present study.

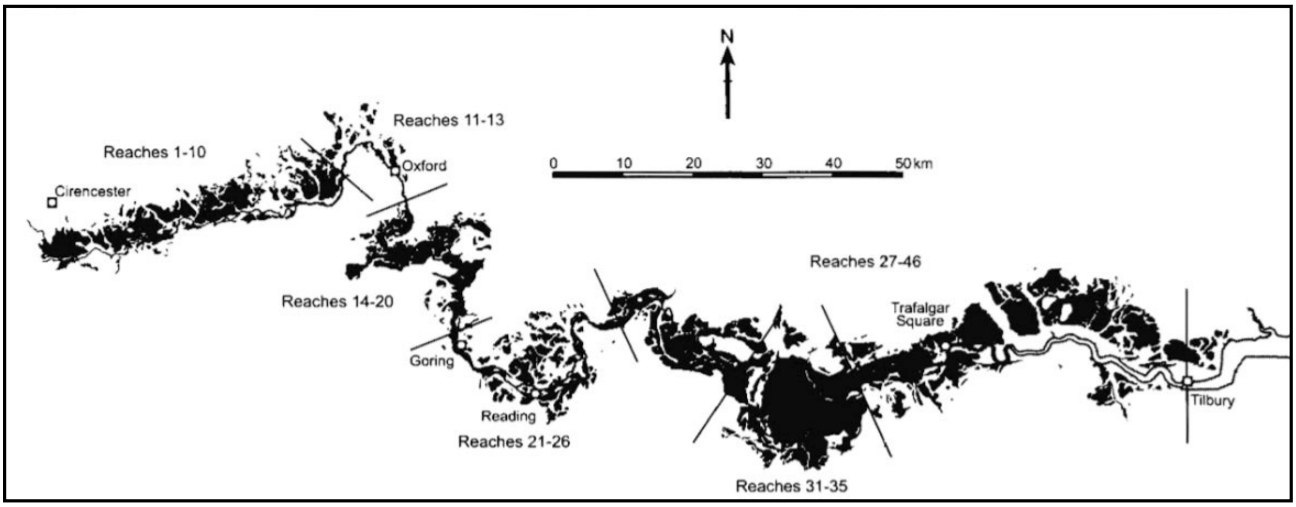


Figure 6.1. A map of the Thames showing the reaches of the river, which share similar hydrological and sedimentological conditions, as identified by Lewis et al., (2004). The Upper Thames corresponds to Reaches 1 – 13. The Middle Thames is approximately defined by Reaches 21 – 35. The Lower Thames corresponds to Reaches 27 – 46. Reaches 14 – 20 correspond to the artefact (and fluvial terrace gravel) impoverished Goring Gap. Figure from Lewis et al., (2004), Fig. 3., p. 21.

The Medway and Stour are considered together for their geographical proximity, although given that the Medway was confluent with the Thames through much of the Middle Pleistocene, this may again be an arbitrary distinction (Bridgland 1988). There is good reason to look to these larger river basins, or river systems, for evidence of cultural signatures. Rivers would have been attractive settings to hominins: they would provide water, animal and plant resources, lithic raw materials, and potentially corridors for movement (Hosfield 2011a). River valleys also offer a variety of micro-habitats, with concomitantly diverse resources which provide a measure of protection against climatic and environmental changes (Mellars 1996). The accumulation of lithic artefacts in river- or lake- proximal environments is partly due to site formation processes, but they were also clearly a preferred environment (e.g., at Purfleet (Bridgland et al., 2013), Swanscombe (Conway et al., 1996) or Barnham (Ashton et al., 1998)).

The following analysis will summarise the key points of interest for each river system in terms of metrical, typological and technological attributes. The typological analysis will use a compressed typological scheme first used by Wymer (1985) as outlined in the methodology; the full typological data are appended.

6.4. The Lower Thames and London area.

No MIS 9 handaxe assemblages of significant size were identified in the Lower Thames (i.e., the Thames to the east of London). Purfleet produced only a relatively small handaxe assemblage characterised by crude handaxes (Wymer 1968; Palmer 1975; Schreve et al., 2002); these were not seen by the present author. Beyond Purfleet, two handaxes from Belhus Park, Essex, were seen in the British Museum (shown in figure 6.2.). Belhus Park preserved organic sediments hosting a faunal and floral assemblage, the diversity of species perhaps suggesting a peak interglacial (MIS 9e) age (Ward 1984; Roe et al., 2009; Coope 2010). In any case, the handaxes were found in gravels *above* the interglacial sediments, meaning they can only confidently be dated to the post- interglacial part of MIS 9 (Wymer 1985; Bridgland 1994); Wymer (1999) attributed them to MIS 8. Although the handaxe sample is too small for a meaningful metrical analysis, the potentially chronologically significant typological pairing of ficrons and cleavers is represented.

Figure 6.2. A 220mm long ficron (FM, left) and cleaver (H, right) from Belhus Park, Essex.

The London area was far richer in terms of handaxes. Stoke Newington is the key locality in this area and one of the celebrated 'flagship' sites of MIS 9, given its relatively robust dating and thorough publication history as well as the occurrence of Smith's famous 'Palaeolithic floor' (Smith 1882, 1884). Stoke Newington represented something of an outlier in Roe's original Group I, being described as having a greater 'range and relative importance' of handaxe shapes (i.e., greater diversity in form) and also being generally smaller in size, although Roe considered the site to be 'close enough to the others in general character to belong' (Roe 1968a).

Roe (1968a) attempted to capture the 'floor' handaxes by selecting only fresh and slightly rolled objects for his study; this strategy is consistent with primary accounts of the archaeology which suggested that the 'floor' objects were in fresh condition ("most of the weapons and tools being as perfect and keen as on the day they were made", Smith (1884)), but inconsistent with Wymer's analysis of the condition of the relatively few handaxes which could be securely provenanced to the 'floor', as summarised in the site backgrounds chapter (Wymer 1968). Nevertheless, the description of a 'Palaeolithic floor' or stack of floors at Stoke Newington over an implementiferous gravel leaves open the possibility of two metrically and typologically distinct series provenanced to Stoke Newington. The 'floor' was described at other nearby localities in north London including Lower Clapton (Smith 1884), although there was some suggestion that it was less prevalent outside of Stoke Newington Common and the surrounding streets (Wymer 1968).

No clear metrical difference between more and less abraded handaxes from the London area sites was identified in the present study (see Appendix II). The fresher sub-sample from Stoke Newington was found to be slightly narrower, and therefore closer in character to Roe's 'original' Group I (i.e., Group IA), but still rather broader than the typical Group I sites from Roe's study such as Furze Platt. No clear difference in length, tip shape or refinement was detected. Nor was there a clear difference in typology, (see Appendix III), with small, crude handaxes most common in all condition brackets. From this comparison, it can be suggested that the more abraded half of the Stoke Newington assemblage strongly resembled the less abraded half. Whether this can be extended to suggest that the 'floor' handaxes strongly resemble the gravel handaxes is debatable, although that would be the most parsimonious solution.

In terms of average metrical characteristics, Lower Clapton, Leyton and Iver were all closely similar to Stoke Newington. The present analysis agrees with Roe (1968a), in that the Stoke Newington handaxe assemblage and nearby sites are similar to his Group I, but with subtle differences as shown in table 6.1.

*Table 6.1. A table to compare key metrical and attribute data ranges for the Lower Thames/ London area. *data from Roe (1968a) ** data from White (1998).*

Group/ Site	**Mean Elongation.**	**Mean Tip Shape.**	**Mean Planform.**	**Mean Refinement.**	**Scar density (removals/L).**	**% residual cortex.**
Group I (range)	0.587 – 0.615*	0.650 – 0.740*	0.330 – 0.370*	0.533 – 0.610*	0.294 – 0.395**	11.5 – 18.5**
Group II (range)	0.625 – 0.665*	0.510 – 0.625*	0.289 – 0.339*	0.475 – 0.595*	0.250 – 0.478**	10.5 – 14.0**
Group III (Wolvercote)	0.560*	0.565*	0.311*	0.559*	0.425**	10.5**
Lower Thames/ London area.						
Leyton	0.650	0.642	0.316	0.516	0.27	10.76

Lower Clapton	0.638	0.641	0.333	0.549	0.41	11.19
Stoke Newington	0.634	0.658	0.327	0.553	0.42	17.05
Iver	0.642	0.617	0.324	0.527	x	25.07
RANGE.	0.634 – 0.650	0.617 – 0.658	0.316 – 0.327	0.516 – 0.553	0.27 – 0.42	10.76 – 25.07

The greatest difference between these sites and Roe's original Group I was in their range of average elongation values, which falls outside the range of the Group I and is more closely aligned to Group II representing broader handaxes (Roe 1968a). The London area sites were found to be slightly more refined than Roe's original Group I, perhaps due to the reduced importance of thick butted pointed types. Metrical points made up between 52.38% (Lower Clapton) and 69.44% (Leyton); these were broadly consistent with the range of values in Roe's Group I (64.8 – 47.7%), although many of the sites in the present study were found to exceed the most point-dominated of Roe's original sites (Furze Platt: 64.8%); in any case, variations in planform index are a poor way of differentiating between Group I and II. Likewise scar densities are consistent with both Group I and II, although the slightly higher percentage of retained cortex on the London area handaxes is more suggestive of Group I than Group II. Typologically, Stoke Newington, Lower Clapton and Leyton were most similar to each other, showing a pronounced preference for small, pointed (type E) handaxes, typical examples of which are shown in figure 6.3.

Figure 6.3. Typical examples of type E handaxes from Stoke Newington, where they formed a large proportion of the assemblage. Note the variability (and irregularity) in planform outline and generally low elongation.

A typological comparison is shown in figure 6.4. A general preference for type E handaxes was evident, although this was less pronounced at Iver, which had a greater representation of pointed types (type F) and larger crude types (type D).

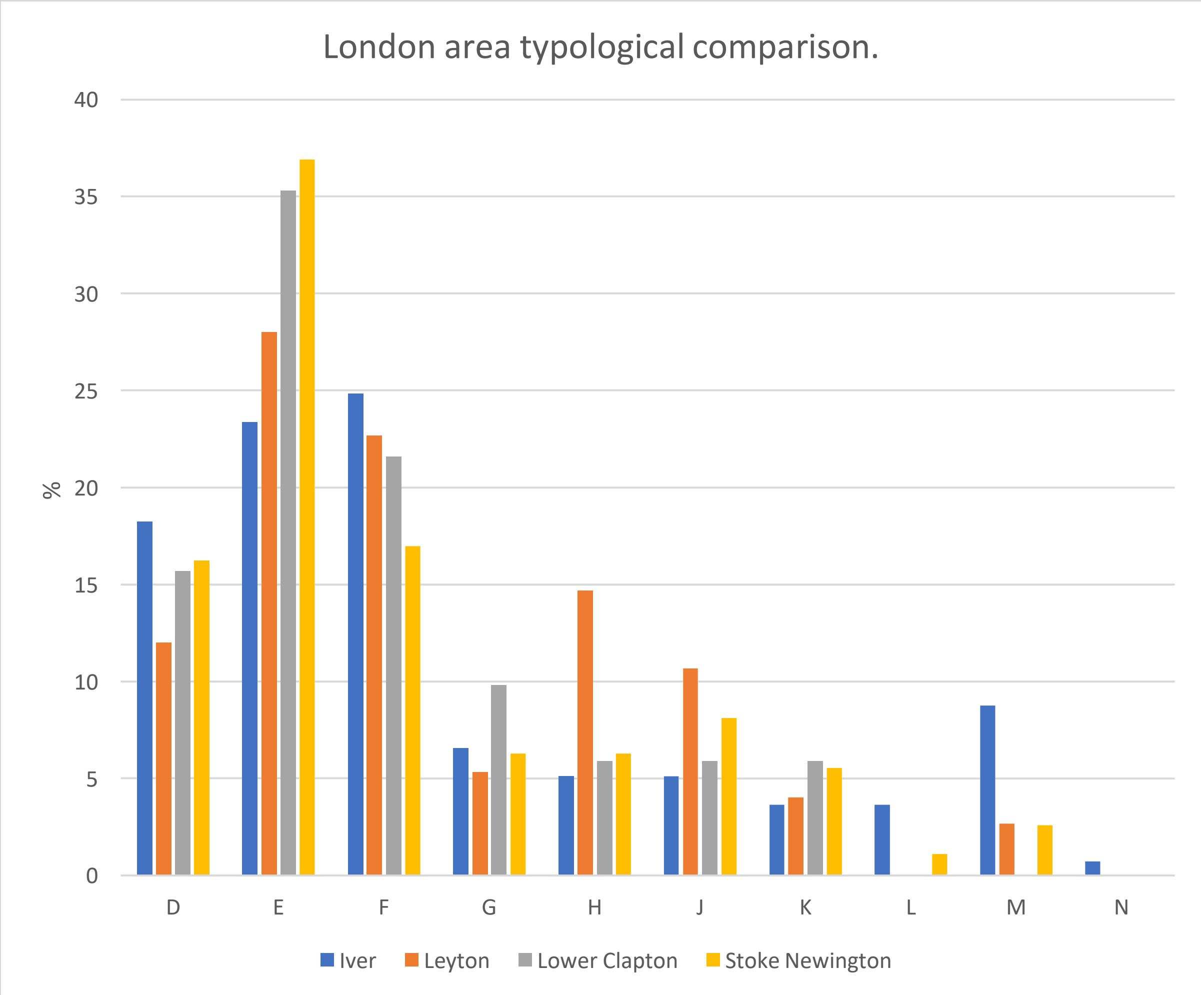


Figure 6.4. A comparison of the typology of sites in the London area. Whilst a range of types are represented, there appears to be a preference for small crude types (type E) with pointed types (type F).

A number of additional Lynch Hill Terrace sites in the London area can be integrated into the regional picture, comprehensively described in Wymer (1968). Wymer's analyses for three of the largest of these additional sites – Stamford Hill, Ealing and Hanwell – are shown below in figure 6.5, along with his own analysis of Stoke Newington ('floor' and gravel) and Lower Clapton.

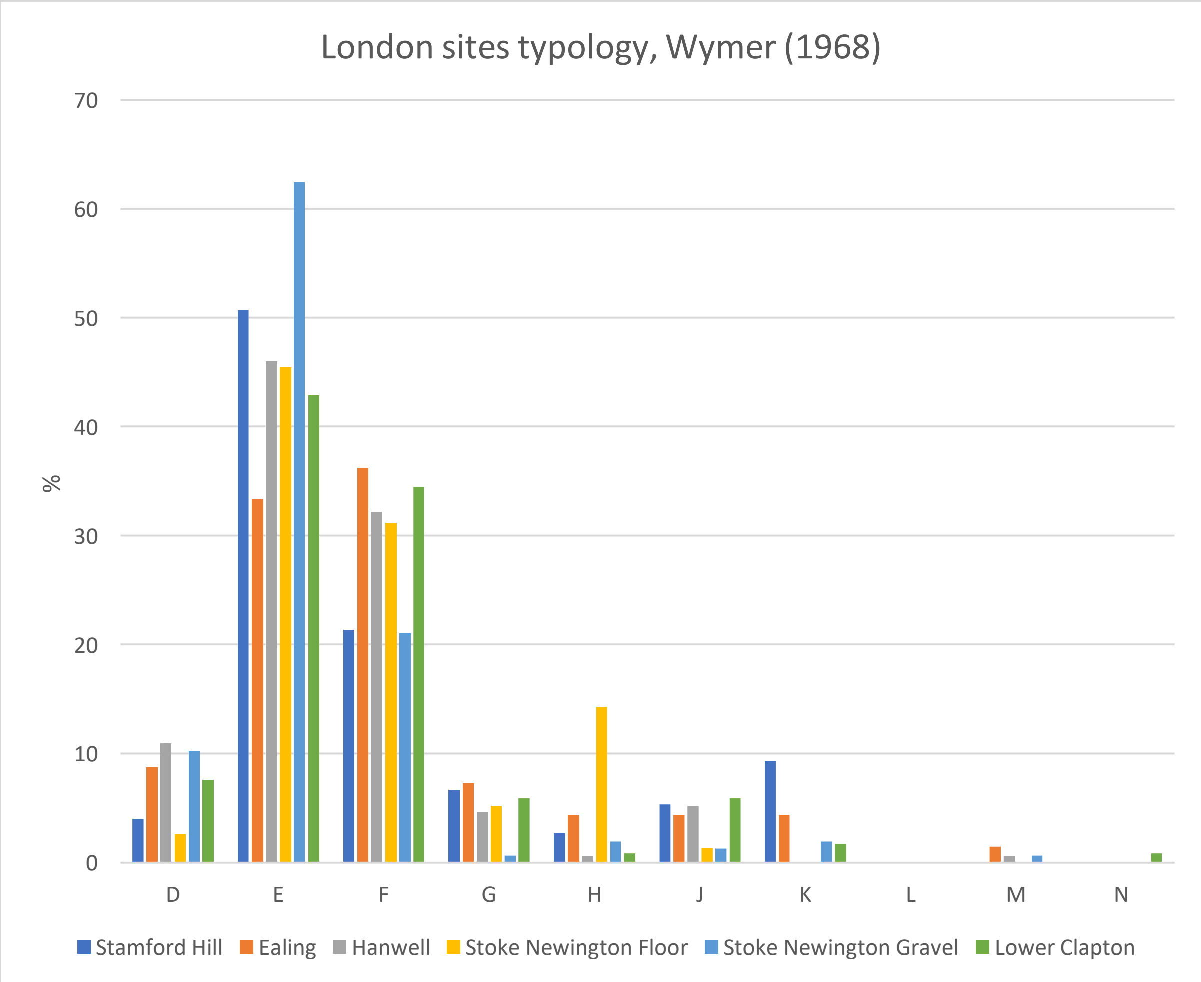


Figure 6.5. A comparison of the typology of sites in the London area using data from Wymer (1968). There is a notable preference for smaller, crude types (type E) at most sites except for Ealing, where pointed types (type F) are slightly more dominant.

These assemblages are clearly of the Group IB 'Stoke Newington type', with a predominance of small, crude types, a good representation of pointed types, and a generally low proportion of other types. Cleavers were found to be distinctly uncommon and ficrons almost absent in Wymer's analysis, although this was less apparent in the present analysis (discussed below). The apparently low diversity of types at Stoke Newington seems to contrast with Roe's (1968a) observation that a greater 'range and relative importance' of handaxe shapes was present at Stoke Newington when compared to his other Group I sites. Roe's observations may be a reflection of the greater range of *metrical* shapes due to a higher proportion of irregularly shaped type E handaxes (resulting in a wider scatter of planform, elongation and tip shape values) rather than a genuine diversity of types.

The position of the Hillingdon assemblage is unclear. Metrically, the assemblage resembles the Middle Thames (sub-group IA) sites (see below), although it is marginal to that group. Typologically, Hillingdon alone showed a preference for larger crude types (type D, DF). The Hillingdon collection was derived from at least six discrete gravel pits across a large area (as well as handaxes provenanced to three discrete areas within the London Borough of Hillingdon), which makes its 'unity' doubtful, although Wymer's comparisons of handaxes derived from pits in Yiewsley and Dawley showed close similarity, suggesting that the pits in the area did produce similar material (Wymer 1968).

6.5. The Middle Thames

The general similarity of handaxe assemblages from sites on the Lynch Hill Terrace of the Middle Thames has been widely noted (Lacaille 1940; Wymer 1968; Roe 1968a, 1981). They are characterised by large, narrow handaxes with ficrons and cleavers but generally lacking large numbers of refined ovates and cordates. That said, significant inter-site variation has also previously been noted (Cranshaw 1983); elements of both commonality and variation are confirmed by the results presented here.

The Middle Thames is well represented in this study. Furze Platt, Ruscombe, Baker's Farm and Cookham aligned closely with Roe's Furze Platt sample in average metrical terms, and thus with Group I. Lent Rise showed similar characteristics, although its tripartite diagrams showed a greater degree of scattering (i.e., less standardisation of form) than the other sites. Despite this broad similarity in shape preference, significant metrical variation is also apparent. A comparison of the Middle Thames sites to previously recorded Group I ranges, and to the Lower Thames/ London area (above) is shown in figure 6.2.

*Table 6.2. A table to compare key metrical and attribute data ranges for the Middle Thames area. *data from Roe (1968a) ** data from White (1998).*

Group/ Site	Mean Elongation.	Mean Tip Shape.	Mean Planform.	Mean Refinement.	Scar density (removals/L).	% residual cortex.
Group I (range)	0.587 – 0.615	0.650 – 0.740	0.330 – 0.370	0.533 – 0.610	0.294 – 0.395	11.5 – 18.5
Group II (range)	0.625 – 0.665	0.510 – 0.625	0.289 – 0.339	0.475 – 0.595	0.250 – 0.478	10.5 – 14.0
Group III (Wolvercote)	0.560	0.565	0.311	0.559	0.425	10.5
Lower Thames/ London area (range)	0.634 – 0.650	0.617 – 0.658	0.316 – 0.327	0.516 – 0.553	0.27 – 0.42	10.76 – 25.07
Middle Thames area.						
Baker's Farm	0.582	0.643	0.297	0.514	0.35	14.29
Cookham	0.597	0.707	0.302	0.581	0.29	13.80
Furze Platt (CCF)	0.575	0.610	0.305	0.565	0.29	14.62
Lent Rise	0.614	0.691	0.361	0.560	0.26	18.61
Ruscombe	0.583	0.617	0.323	0.557	0.28	14.38

RANGE.	0.575 – 0.614	0.610 – 0.707	0.297 – 0.361	0.514 – 0.581	0.26 – 0.35	14.29 – 18.61

The proportion of metrically pointed handaxes ranged from 47.22% (Lent Rise) to 75.93% (Cookham), often exceeding the range of Roe's Group I. Likewise, the proportion of cleavers ranged from 2.27% (Ruscombe) to 10.19% (Lent Rise). The planform index range aligns closely with Roe's Group I range (Roe 1968a). Baker's Farm was found to lack metrical cleavers in this study; this is perhaps due to the relatively small sample size, as Roe's (1968a) study found 8.9% of his much larger sample to be a metrical cleaver. Elongation values were lower than the London area sites but consistent with Roe's original Group I sites (Roe 1968a), indicating narrow handaxes. The range of refinement values overlapped with the London area sites but was slightly lower than Roe's Group I. The greatest similarity between the Middle Thames sites is seen in their average, assemblage level morphometric profiles (particularly in their shared preference for narrow forms over broad forms), but a relatively large diversity in tip-shape and planform shape was identified.

Figure 6.6. shows the typological comparison for the Middle Thames area.

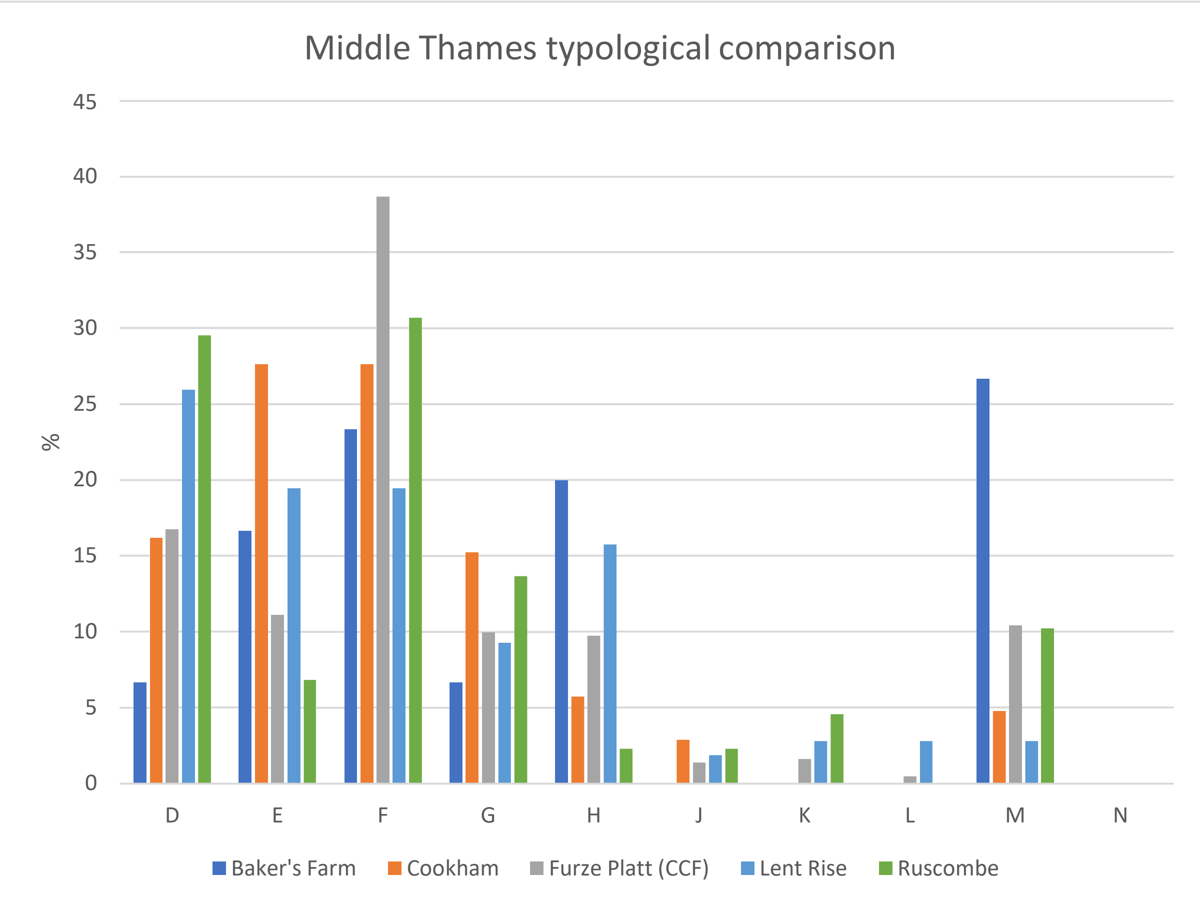


Figure 6.6. A comparison of the handaxe types at the Middle Thames sites in this study, showing a clear preference for pointed (F) and crude pointed (D, E) types with a generally good but variable representation of ficrons (M) and cleavers (H), and low numbers of cordates (J) and ovates (K).

The Middle Thames sites showed a strong preference for pointed types (type F), large and crude types (type D) and small, crude types (type E), although the latter were uncommon at Furze Platt (Cannoncourt Farm Pit) and Ruscombe. A selection of pointed handaxes from Furze Platt are shown in figure 6.7, showing the variability present within the type.

Figure 6.7. Three unremarkable but quite typical pointed handaxes from Furze Platt (Cannoncourt Farm Pit), showing the variable forms taken by the type including one with slightly convex edges in planform (centre; type FG).

A wide range of other types were also represented in variable proportions, but ovates and cordates (type K and J) were rare or absent at all sites. Ficrons (type M) and cleavers (type H) were present at all sites, but again in distinctly variable proportions. Baker's Farm had the highest proportion of typological cleavers (20%), in stark contrast to the absence of metrical cleavers in this analysis. White (2006) noted the potential for a typological cleaver to appear in the ovate section of Roe's tripartite diagrams – this is almost certainly the case with Baker's Farm as around half of the Baker's Farm cleavers were type GH, or transitional between sub-cordate and cleaver forms. Typological cleavers were also common at Lent Rise (15.75%), but uncommon at Ruscombe (2.27%). Ficrons were equally variable: Baker's Farm (26.67%) Cannoncourt Farm Pit (10.41%) and Ruscombe (10.23%) were all relatively ficron-rich, whilst the other Middle Thames sites had <5% ficrons.

A handful of additional sites may be relevant to this discussion, particularly Grovelands Pit and McIlroy's Pits (both near Reading). Grovelands Pit breaks with the overwise convincing patterning of Group IA assemblages in the Middle Thames region. The site is well published with descriptions of fauna, archaeology and geology given (e.g., Stevens 1882; Blake & Stevens 1885; Shrubsole 1885, 1890; Wymer 1968). Geologically, the pit was situated near or on the steep bluff where the Lynch Hill terrace descended to the Taplow terrace (Wymer 1968). The stratigraphy was probably laterally variable, but included gravel over Reading Sand and Clay, with underlying chalk bedrock (Shrubsole 1890; Stevens n.d. in Wymer 1968). Artefactual and faunal remains were found towards the base of the gravel (Wymer 1968). Wymer's typological analysis of the handaxe assemblage (figure 6.8 below) showed almost equal proportions of pointed, ovate and crude types, with significant numbers of cordates and sub-cordates, along with a handful of refined cordate-cleavers (type JH, a type which Wymer did not use elsewhere, perhaps suggesting an unusual or unique form – these are included with type H cleavers in figure 6.8).

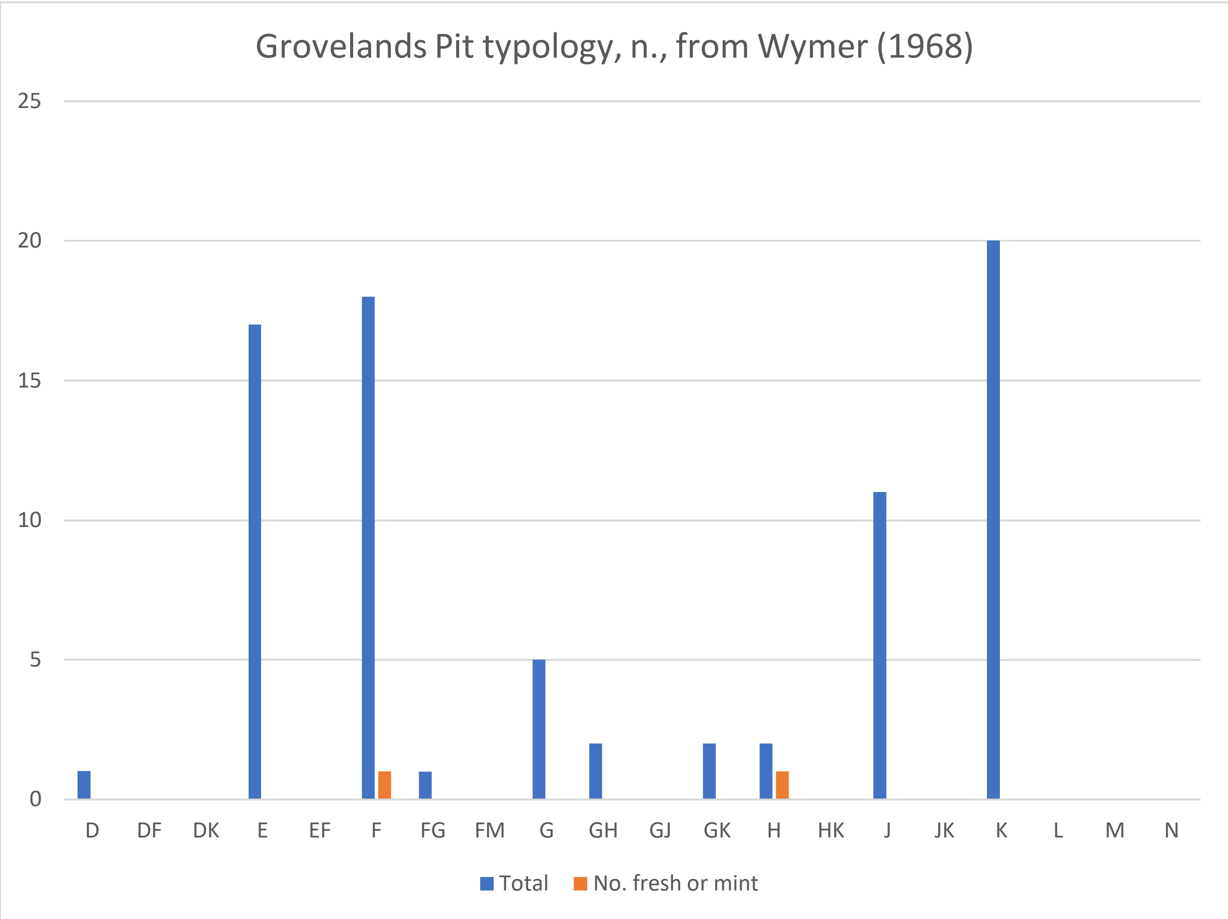


Figure 6.8. A typological analysis of the Grovelands Pit handaxe assemblage, from data in Wymer (1968).

All but two of the handaxes was in rolled or very rolled condition. The large proportion of ovates and cordates is unlike the typological makeup of either Group IA or Group IB sites. The typological makeup of the assemblage could certainly be called 'generalised', leaving open the possibility of a Group IV attribution, although the limited comparable data for such sites would suggest that crude types are generally rarer than they appear to be at Grovelands Pit (see below). The overwhelmingly high level of abrasion could suggest derivation from higher terraces, which might have resulted in inter-period mixing (Roe 1981; Hosfield 2011a). Neither Wymer nor Roe reported Levallois technology from the site, but both drew attention to 'Clactonian' material which included high proportions of formal flake-tools, and which tended to be in fresher condition than the handaxes (Wymer 1968; Roe 1968b; 1981). The difference between the Grovelands Pit assemblage and other Middle Thames Lynch Hill sites can be seen in the presentation of Wymer's Middle Thames data, shown in figure 6.9. Wymer's analysis of Middle Thames sites suggests an even greater degree of typological agreement between most sites than was observed in this study, with a very strong preference for pointed types.

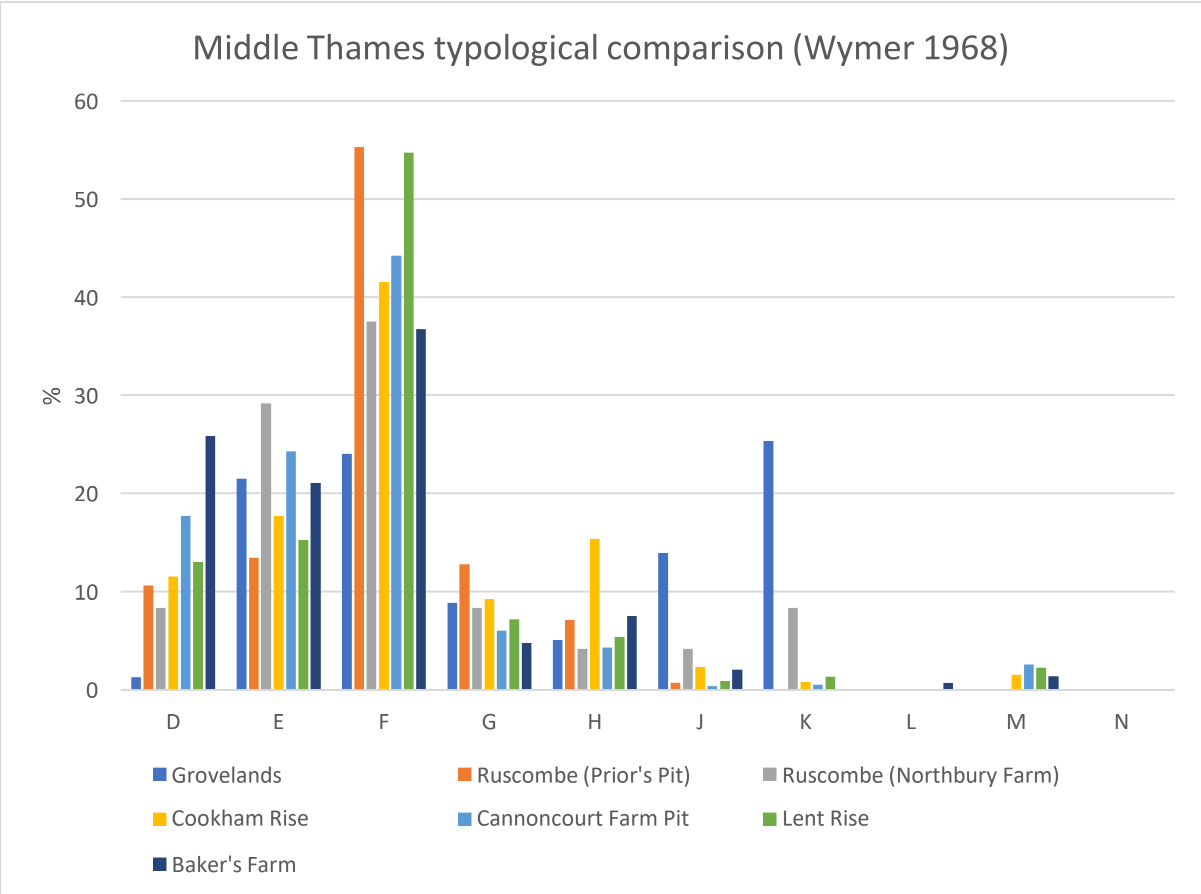


Figure 6.9. A comparison of the typology of sites in the London area using data from Wymer (1968). There is a much clearer preference for pointed (type F) handaxes in Wymer's data than in the present study, but the overall pattern is comparable.

McIlroy's Pit, Reading makes a final interesting, if frustratingly enigmatic addition to the Middle Thames regional analysis. The site is poorly published but is known to have produced a small, very fresh Acheulean assemblage (Roe 1968b; Wymer 1968; Roe 1981). The assemblage consisted of 15 finely made pointed handaxes originating from ‘a kind of pocket’ of mixed clay and gravel at the base of the fluvial terrace deposits, in association with the underlying clay (G. Smith quoted in Wymer 1968; Hosfield 2009). McIlroy’s Pit was situated at the extreme inside edge of the Lynch Hill terrace, possibly on the bluff descending to the Taplow terrace (Roe 1981). Roe (1981) noted that the character of the handaxe assemblage was quite different to other Lynch Hill terrace sites in the Middle Thames, as McIlroy’s Pit had a very low diversity of types. Every handaxe was pointed in planform; there is some discrepancy as to whether this included ficrons, with Roe (1981) suggesting ficrons were present but Wymer (1968) recording none. Crucially, there was no suggestion of cleavers or any other handaxe types being present (Roe 1981). Wymer’s analysis confirmed this: 13 of the 15 handaxes (86.67%) were type F, with an average size of ~147mm. This is probably an underestimate, given that four of the objects had missing tips - one handaxe with a missing tip was recorded as being 229mm in length, suggesting that its original size must have been extremely large. Roe interpreted the McIlroy’s Pit assemblage as evidence of a highly specific and task-oriented toolkit, produced by one or a single group of skilled knappers such as can occasionally be picked out from undisturbed, very fresh handaxe assemblages which record only a ‘snapshot’ of behaviour (c.f. Wolvercote, discussed fully below). One further site which may be of interest is Twyford, Berkshire: the site was located on Lynch Hill terrace deposits and may be related to nearby Ruscombe but is virtually unpublished (Wymer 1968). It would not merit a mention here, except that the two Twyford handaxes located in the BM Sturge collection were - perhaps significantly – a large ficron and fan-shaped cleaver (shown below in figure 6.10).

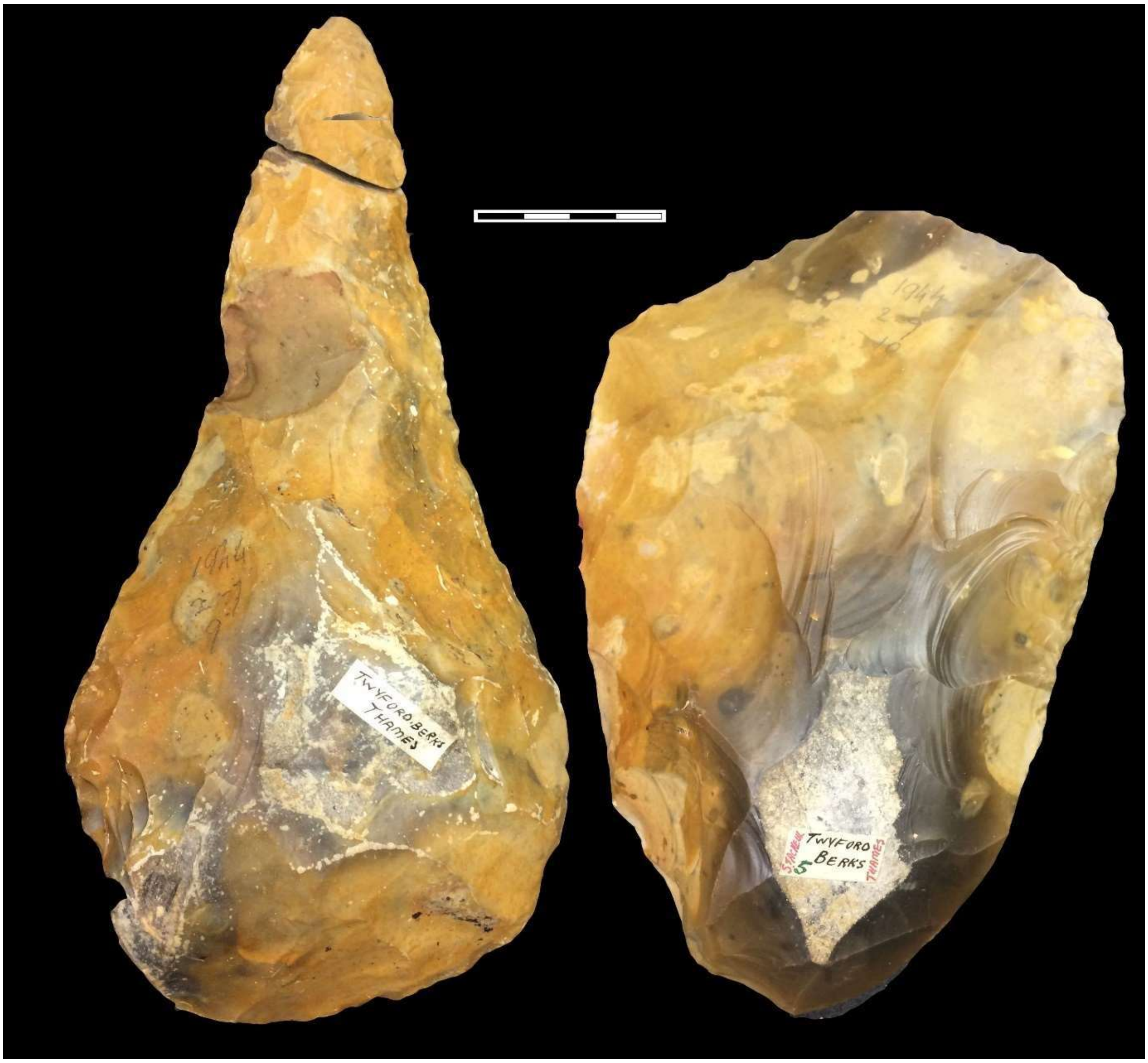


Figure 6.10. A large ficron and cleaver from Twyford, Berks.

The Farnham (C terrace) assemblage is the sole representative of the terraces of the palaeo-Blackwater, a south-bank tributary of the Thames via the Loddon (White & Bridgland 2018), which joins the main channel in the Middle Thames region. The handaxes were found to be very much of the Middle Thames Group IA variety, with ficrons and cleavers.

6.6. The Medway and Kentish Stour.

Cuxton, Twydall, Ham Hill (Snodland) and Canterbury West all aligned well with Group IA and were found to be similar in average morphometric terms to Roe's Twydall and Cuxton samples (Roe 1968a). Aylesford was somewhat intermediate between the two proposed sub-groups. The proportion of metrically pointed handaxes ranged from 57.89% (Ham Hill) to 65% (Twydall), overlapping with the upper range of Roe's Group I (Roe 1968a). The proportion of metrical cleavers ranged from 4.57% (Cuxton) to 17.65% (Canterbury West), with sites generally cleaver-rich compared to Roe's original range (3.1% - 8.9%). Metrical comparisons are shown in table 6.3.

*Table 6.3. A table to compare key metrical and attribute data ranges for the Medway/ Kentish Stour area. *data from Roe (1968a) ** data from White (1998).*

Group/ Site	Mean Elongation.	Mean Tip Shape.	Mean Planform.	Mean Refinement.	Scar density (removals/L).	% residual cortex.
Group I (range)	0.587 – 0.615*	0.650 – 0.740*	0.330 – 0.370*	0.533 – 0.610*	0.294 – 0.395**	11.5 – 18.5**
Group II (range)	0.625 – 0.665*	0.510 – 0.625*	0.289 – 0.339*	0.475 – 0.595*	0.250 – 0.478**	10.5 – 14.0**
Group III (Wolvercote)	0.560*	0.565*	0.311*	0.559*	0.425**	10.5**
Lower Thames/ London area (range)	0.634 – 0.650	0.617 – 0.658	0.316 – 0.327	0.516 – 0.553	0.27 – 0.42	10.76 – 25.07
Middle Thames area (range)	0.575 – 0.614	0.610 – 0.707	0.297 – 0.361	0.514 – 0.581	0.26 – 0.35	14.29 – 18.61
Medway/ Kentish Stour area.						
Aylesford	0.620	0.653	0.347	0.478	x	x
Canterbury West	0.569	0.621	0.331	0.489	0.23	4.12
Cuxton	0.584	0.661	0.321	0.589	0.29	19.69
Ham Hill	0.601	0.687	0.305	0.518	x	x
RANGE.	0.569 – 0.620	0.621 – 0.687	0.305 – 0.347	0.478 – 0.589	0.23 – 0.29	4.12 – 19.69

Elongation values were lower than the London area sites but broadly overlapping with the Middle Thames sites and Roe's original Group I sites, indicating narrow handaxes. The wide range of refinement values shows a greater variability in refinement than in the Middle Thames and London area sites but overlapped with the lower end of Roe's Group I. Typologically the Medway and Stour sites showed similar preferences to those seen in the Middle Thames (i.e., mostly pointed types with a co-occurrence of cleavers and ficrons, crude types, and a diverse array of 'accessory' types in low numbers). The variable proportions of each type between the five Medway and Stour sites may be the consequence of a bias in collection; the Canterbury West collection was at least partly assembled through purchase, with competition for the finest pieces (Knowles forthcoming), explaining the complete lack of crude types from that site. Artefacts from Twydall were collected from redeposited aggregate although the presence of some small, crude types might point to less selectivity in collection (Beresford 2019). Cuxton was one of the very few sites in this study to be formally excavated, and as such is probably the most representative sample from the area (Tester 1965; Cruse 1987; Wenban-Smith 2004). Crude types consequently form a slightly larger proportion of the Cuxton assemblage, although they are notably less common in the Medway and Stour than in either the Lower or Upper Thames. A reduced typological comparison for the Medway and Stour sites is shown in figure 6.11.

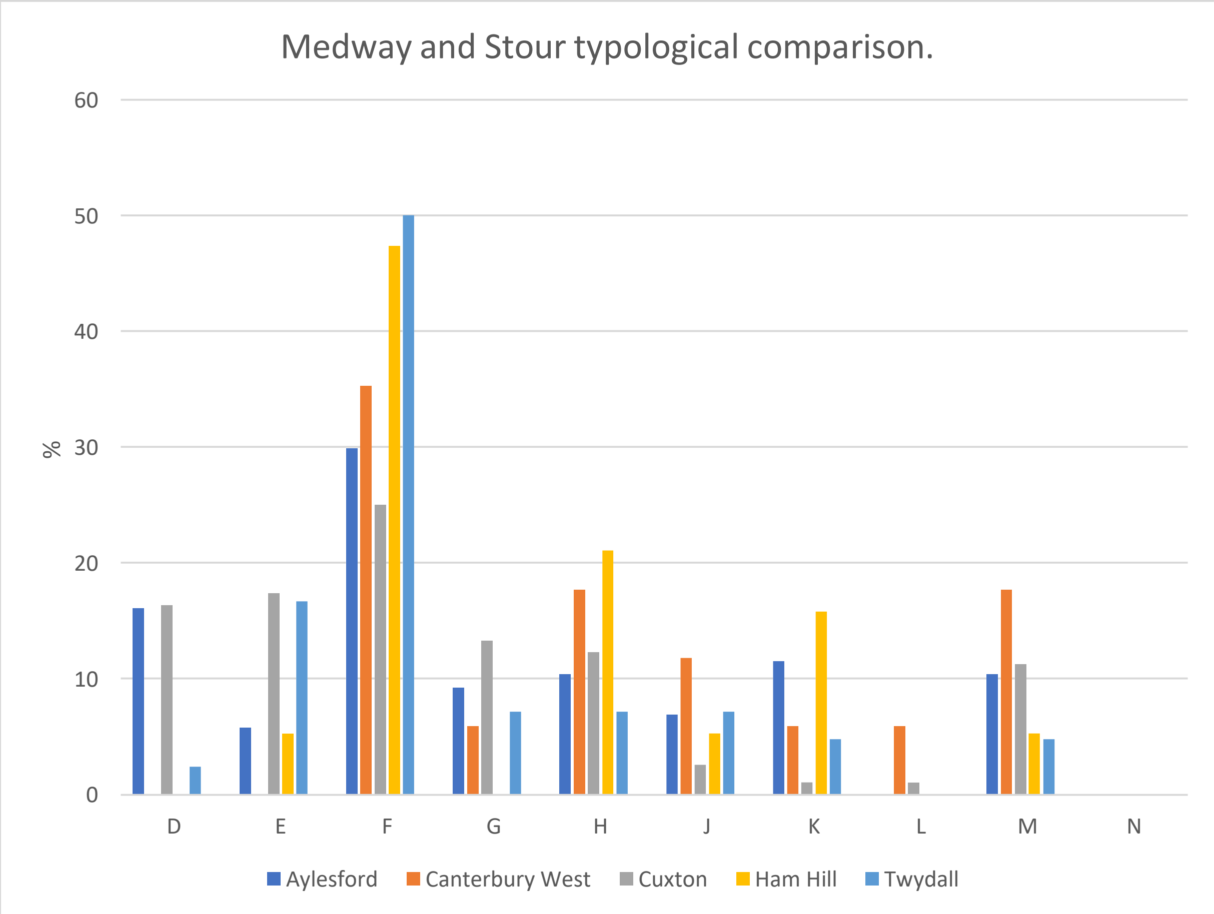


Figure 6.11. A comparison of the main handaxe types at the Medway and Stour sites in this study, showing a clear preference for pointed (F) types with a strong representation of ficrons (M) and cleavers (H). Ovates and cordates are more common than in the Middle Thames, although still only a minor component of any given assemblage.

6.7. The Upper Thames.

The Upper Thames had two distinct groups, defined by shared metrical and typological characteristics. The first group was formed by Berinsfield and Gravelly Guy (Stanton Harcourt), which were closest in average morphometric terms to Group IB. Both sites had relatively abundant quartzite handaxes; when these were removed from the analysis, the Berinsfield assemblage became narrower but the average elongation values (0.63 for both sites) were still broader than the range of Roe's Group I (0.587 – 0.615) (Roe 1968a). This is shown in figure 6.12. Average refinement values (0.483 – 0.519) were lower than Roe's Group I, indicating slightly more refined handaxes.

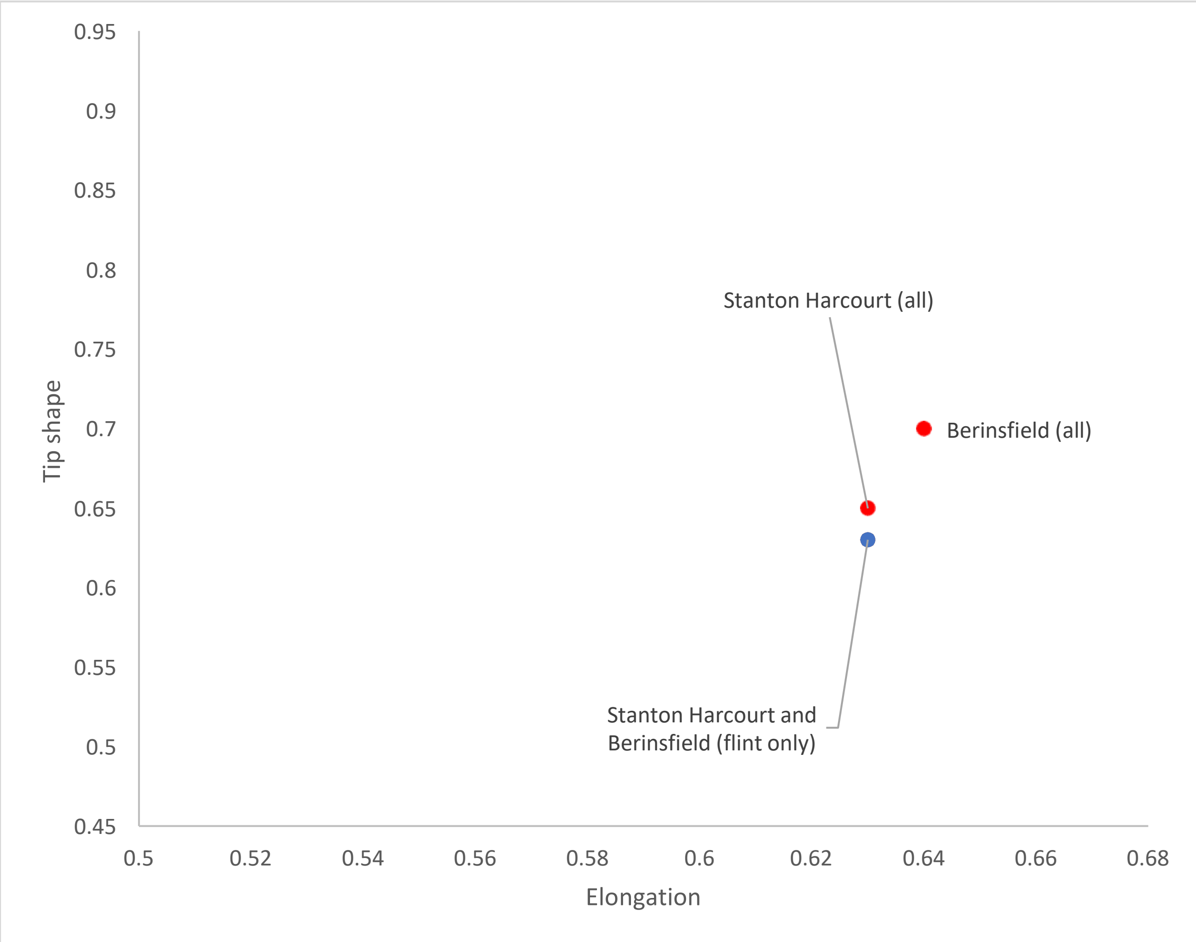


Figure 6.12 A figure to show the impact of removing quartzite handaxes from the morphometric analyses of Berinsfield and Gravelly Guy (Stanton Harcourt). The assemblages including quartzite are shown in red; the blue marker shows flint handaxes only.

The typological analysis of the two assemblages produced using data from Lee (2001) using a simple descriptive scheme, is compared below in figure 6.13. Typologically the sites are a closer match for the Middle Thames (Group IA) sites, with a majority of pointed types over crude types in both cases, along with relatively high proportions of ficrons, although the occurrence of cordates and ovates in relatively large proportions is unusual for either Group IA or IB. Cleavers were uncommon at Gravelly Guy (Stanton Harcourt), but common at Berinsfield where they were often made on quartzite.

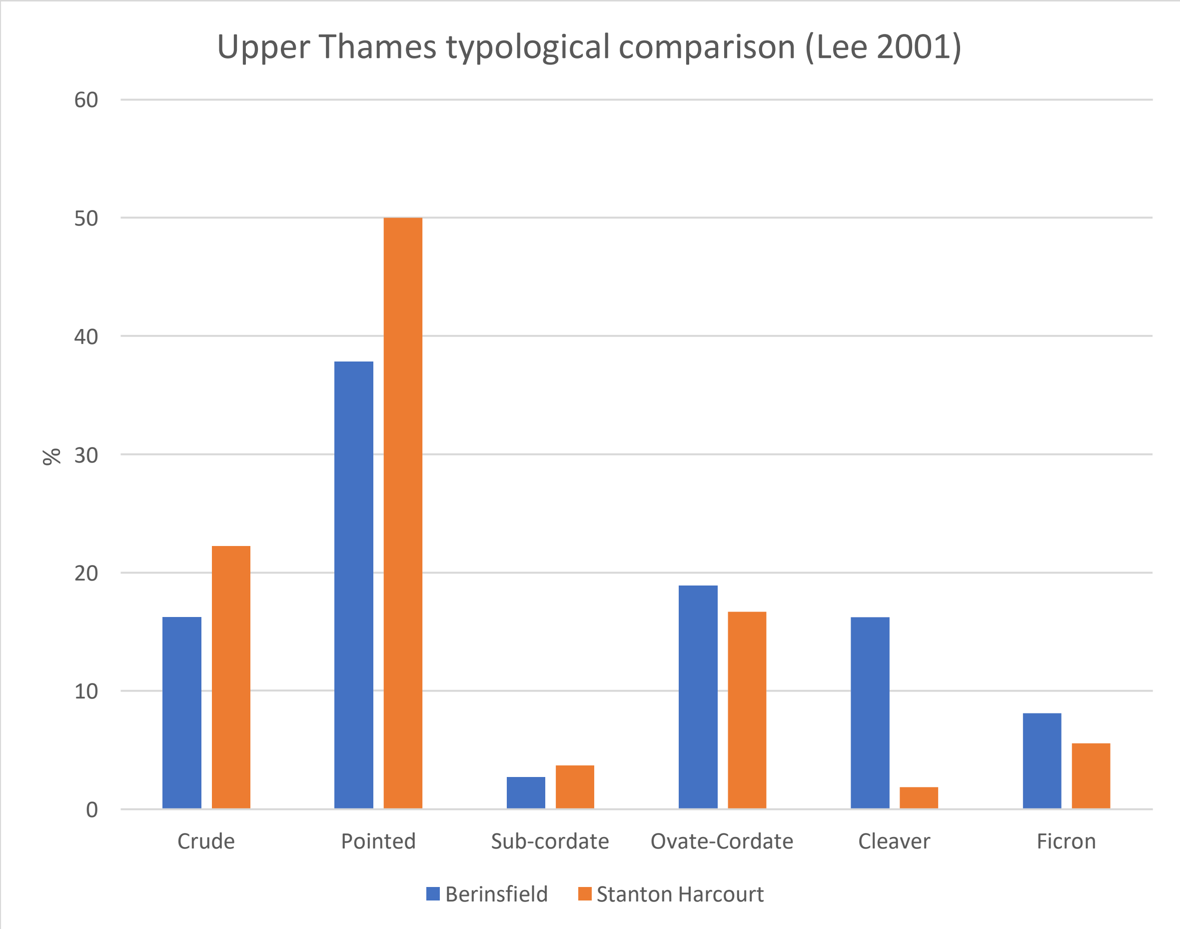


Figure 6.13. A comparison of the typology of Berinsfield and Gravelly Guy (Stanton Harcourt) using the reduced typological scheme and data from Lee (2001).

The second 'group' was populated by Wolvercote, which was the only site assigned to Roe's Group III (Roe 1968a). Five metrical analyses of the Wolvercote handaxes were compared here (Roe 1968a; Tyldesley 1986; Lee 2001; White 2006; Dale (present study)). When both flint and quartzite handaxes were considered together by White, Lee and Dale, the assemblage appeared both broader and blunter on average (a reflection of the smaller, cruder handaxes produced on quartzite at Wolvercote). When quartzite implements were removed there was a remarkable agreement between all five analyses regarding the tip shape, but a moderately high degree of disagreement regarding elongation, shown in figure 6.14. The present author can only speculate that this is the result of different although often overlapping samples measured; if inter-analyst variation were to blame, the tricky B1 and B2 measurements (for tip shape) would be more likely to result in error than the relatively straightforward B and L measurements (for elongation). It should also be noted that the range of elongation values, although greater than the range in tip-shape values, is still relatively small (range ~0.06). Roe's analysis and the present study form bookends in terms of maximum and minimum elongation, with White, Tyldesley and Lee in closer agreement. The elongation values for the latter three samples overlap with the wider Group IA range. The tip shapes are notably greater in pointedness than other supposed MIS 9 (Group IA/ IB) sites; this is presumably because of the extreme dominance of pointed types at the site, coupled with an almost total absence of ovates and cleavers.

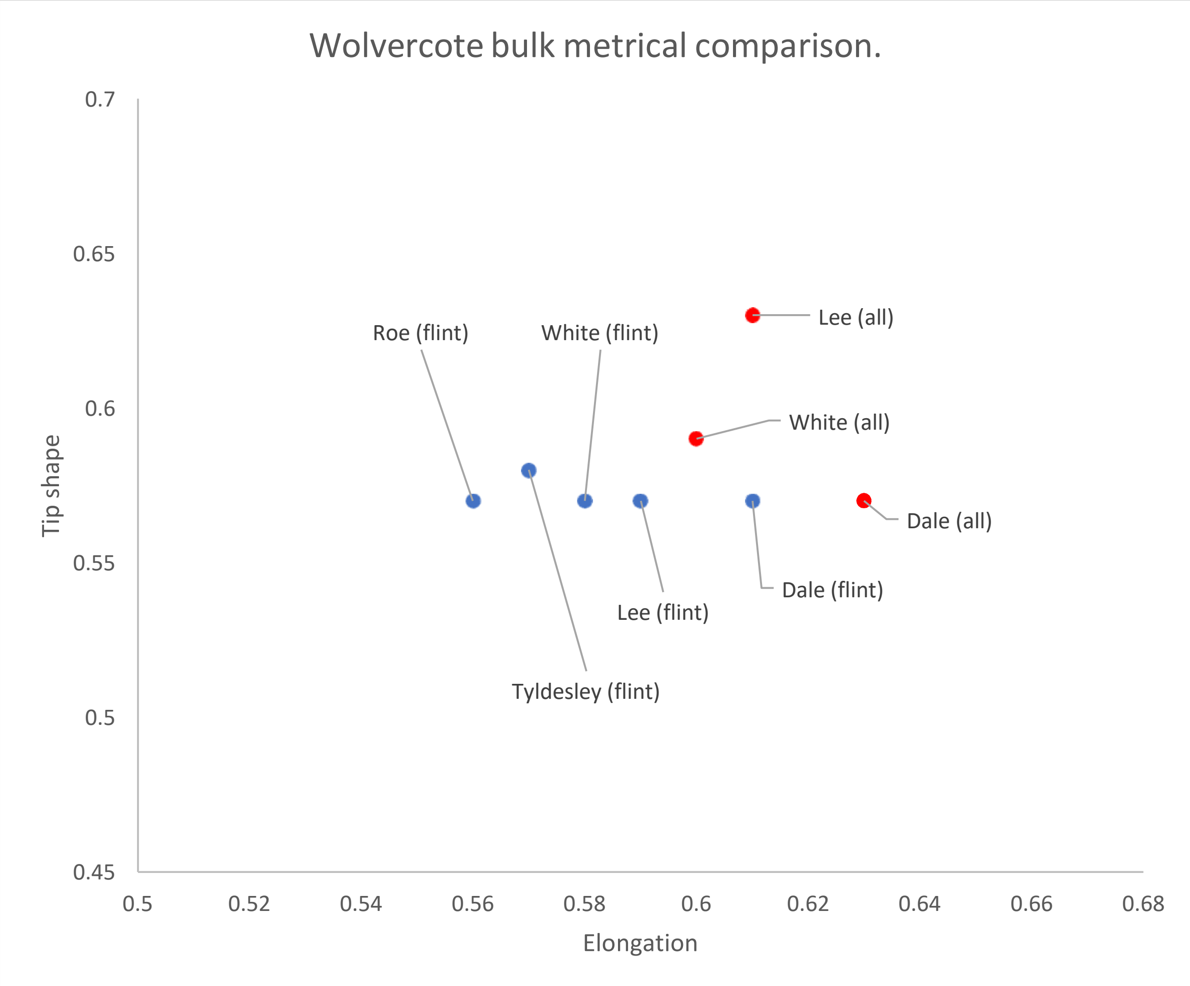


Figure 6.14. A figure to show the impact of removing quartzite handaxes from the morphometric analyses of Wolvercote (various analysts). The assemblages including quartzite are shown in red; the blue marker shows flint handaxes only.

There is agreement between studies that the Wolvercote assemblage lacked metrical cleavers. This would generally disqualify a site from inclusion in Roe's Group I, but this disqualification may be challenged on two counts: i) the proportion of metrical cleavers at other Group I sites is extremely variable and often below 5% of the total, making it possible that the assemblage was too small to be fully representative and ii) the Wolvercote assemblage may not be representative of the entire repertoire of handaxe forms produced by the cultural group operating in the area. Tyldesley (1986) had suggested that the handaxes may have been made by an individual or small group over a short period of time for a specific task; this may be compared to the monotypical pointed assemblage from McIlroy's Pit (Wymer 1968). It should also be noted that presence of a single sub-cordate – cleaver (type GH) in the Wolvercote assemblage suggests that cleavers *were* a part of the toolkit at

Wolvercote but were not produced extensively at the time and place the assemblage was formed. The large, 'slipper-shaped' plano-convex handaxes which are the defining (although not dominant) feature of the Wolvercote handaxe assemblage are discussed fully below.

The dating of the Upper Thames sites presents a final important question, which is perhaps insoluble based on the archaeological data alone. The dating of the various Upper Thames terraces is less robust than their Middle Thames equivalents, however Bridgland (1994) suggested that that the Wolvercote Terrace was formed in the MIS 9 cycle, and the Summertown-Radley Terrace was formed in the MIS 7 and MIS 5 cycles (representing a double terrace). Where other sites were selected based on their independent dating to MIS 9 (admittedly, with varying degrees of confidence), Berinsfield and Gravelly Guy (Stanton Harcourt) were situated on deposits dated to MIS 7 (Bridgland 1994). Despite this apparent difference in age, the Berinsfield and Gravelly Guy (Stanton Harcourt) handaxe assemblages both have Group I characteristics. Levallois technology was also found at Berinsfield (Lee 2001), which can indicate either late MIS 9 or MIS 7 depending on how developed the technology is (Scott 2011; Rawlinson 2021). The Wolvercote handaxes also somewhat resemble Roe's Group I – perhaps enough to suggest a sub-group rather than an entirely separate group, as discussed below – but are much less typical. No Levallois technology was found at Wolvercote, although it is possible that this may reflect selective collecting rather than a genuine absence (Tyldesley 1986). Based on the established tendency for sites within each MI stage to share morphological and typological preferences (e.g., Bridgland & White 2014, 2015; White et al. 2018, 2019; Hoggard et al., 2019), the Berinsfield and Gravelly Guy (Stanton Harcourt) handaxe assemblages would be obvious candidates for an MIS 9 age. The condition of the artefacts may be enlightening in this case, with the usual caution paid to using taphonomy to gauge age: the Wolvercote assemblage is generally very fresh (Tyldesley 1986; this study), whereas the Berinsfield and Gravelly Guy (Stanton Harcourt) assemblages are overwhelmingly moderately to heavily abraded (Lee 2001). It is therefore possible that the Berinsfield and Gravelly Guy (Stanton Harcourt) assemblages were derived *en masse* from the Wolvercote terrace and were then incorporated into the lower part of the (MIS 7) Summertown Radley Terrace gravel. This explanation was favoured by both MacRae (1982) and Tyldesley (1986) and would suggest broad (millennial scale) contemporaneity between Wolvercote, Gravelly Guy (Stanton Harcourt) and Berinsfield. This does not preclude sub-stage chronological patterning being the cause of the variation between the Upper Thames sites, although it is not possible to suggest this with any confidence based on current evidence.

6.8. The Great Ouse.

As shown in table 6.4., the undated site at Bromham aligned most closely with Group IA in metrical terms, with an average elongation value overlapping with Roe's Group I. Both Kempston and Biddenham aligned most closely with Group IB, as the handaxes were broader on average, in closer agreement with the London area (sub-group IB) sites. All three sites had average refinement values lower than Roe's Group I, indicating slightly more refined handaxes.

*Table 6.4. A table to compare key metrical and attribute data ranges for the Great Ouse area. *data from Roe (1968a) ** data from White (1998).*

Group/ Site	Mean Elongation.	Mean Tip Shape.	Mean Planform.	Mean Refinement.	Scar density (removals/L).	% residual cortex.
Group I (range)	0.587 – 0.615*	0.650 – 0.740*	0.330 – 0.370*	0.533 – 0.610*	0.294 – 0.395**	11.5 – 18.5**
Group II (range)	0.625 – 0.665*	0.510 – 0.625*	0.289 – 0.339*	0.475 – 0.595*	0.250 – 0.478**	10.5 – 14.0**
Group III (Wolvercote)	0.560*	0.565*	0.311*	0.559*	0.425**	10.5**
Lower Thames/ London area (range)	0.634 – 0.650	0.617 – 0.658	0.316 – 0.327	0.516 – 0.553	0.27 – 0.42	10.76 – 25.07
Middle Thames area (range)	0.575 – 0.614	0.610 – 0.707	0.297 – 0.361	0.514 – 0.581	0.26 – 0.35	14.29 – 18.61
Great Ouse area.						
Biddenham	0.629	0.632	0.318	0.513	0.31	16.02
Bromham	0.594	0.623	0.328	0.494	X	X
Kempston	0.646	0.640	0.329	0.527	0.28	13.25
RANGE.	0.594 – 0.646	0.623 – 0.640	0.318 – 0.329	0.494 – 0.527	0.28 – 0.31	13.25 – 16.02

Typologically, the Great Ouse sites bear less resemblance to Stoke Newington (and by extension, Group IB). All three sites were characterised by a strong preference for pointed forms (type F): small, crude types (type E) were also common and ficrons and cleavers were present. The only notable difference between the Biddenham and Kempston assemblages is that the Kempston handaxes were slightly more abraded and marginally smaller. The metrical differences between these sites and Bromham may be an artefact of the small sample size for the latter assemblage (n=25); certainly, the three assemblages look similar in typological terms, as shown in figure 6.15.

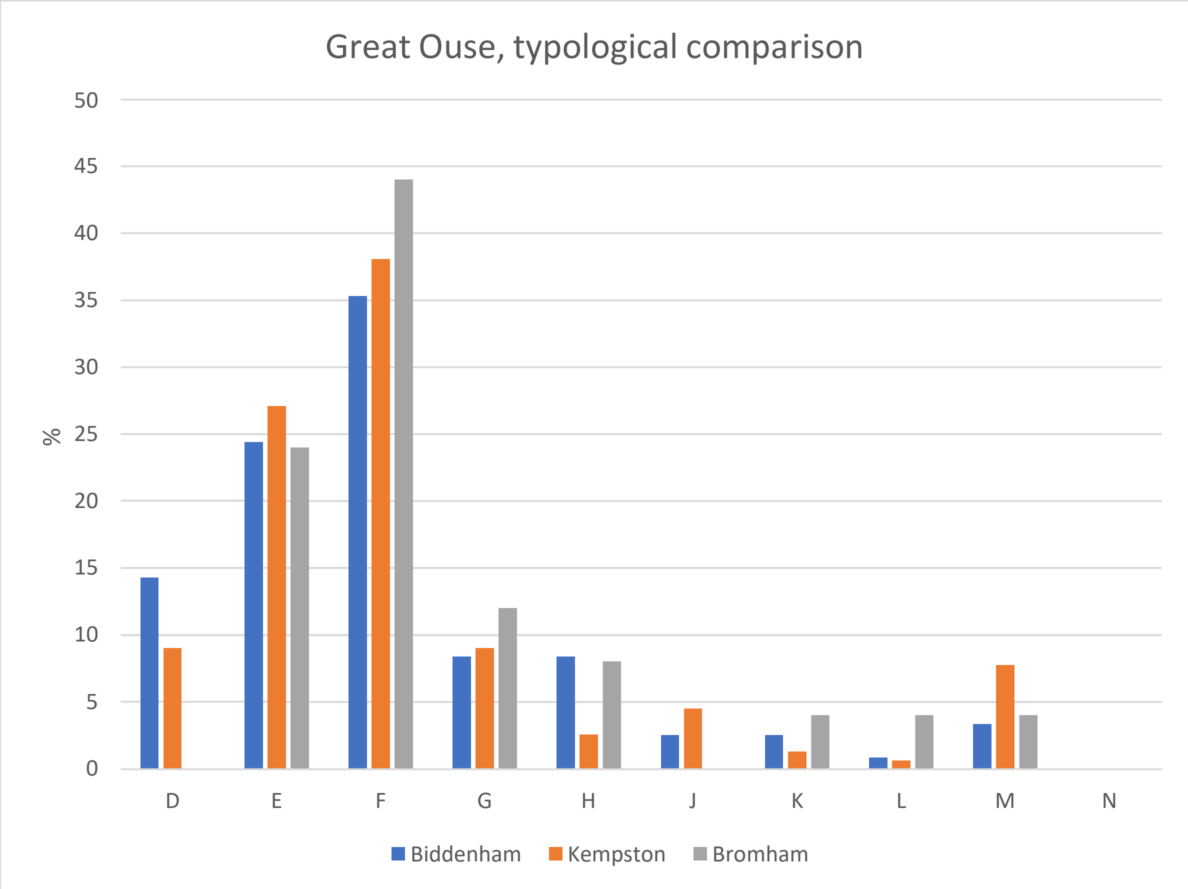


Figure 6.15 A comparison of handaxe types from the Great Ouse. Whilst these sites show a metrical preference for Group IB morphologies, the preference for type F pointed handaxes is a closer match to Group IA.

6.9. East Anglia – the Yare and Little Ouse.

As shown in table 6.5, Keswick and Whitlingham aligned with Group IA in terms of average morphometrics, bearing a close similarity to Roe's own Whitlingham sample. Thetford showed some similarity to Group IA in morphometric terms, although the assemblage was slightly broader than Roe's original Group I. Barnham Heath was an outlier in morphometric terms. It bore no close resemblance to any other site in this study, being characterised by a high degree of scatter (low standardisation) in all three sections of its tripartite diagrams. In bulk morphometric terms, the site was most similar to Group IB in terms of its broadness, but the tip shape index was considerably greater than any other site in that group.

*Table 6.5. A table to compare key metrical and attribute data ranges for the East Anglia area. *data from Roe (1968a) ** data from White (1998).*

Group/ Site	Mean Elongation.	Mean Tip Shape.	Mean Planform.	Mean Refinement.	Scar density (removals/L).	% residual cortex.
Group I (range)	0.587 – 0.615*	0.650 – 0.740*	0.330 – 0.370*	0.533 – 0.610*	0.294 – 0.395**	11.5 – 18.5**
Group II (range)	0.625 – 0.665*	0.510 – 0.625*	0.289 – 0.339*	0.475 – 0.595*	0.250 – 0.478**	10.5 – 14.0**

Group III (Wolvercote)	0.560*	0.565*	0.311*	0.559*	0.425**	10.5**
Lower Thames/ London area (range)	0.634 – 0.650	0.617 – 0.658	0.316 – 0.327	0.516 – 0.553	0.27 – 0.42	10.76 – 25.07
Middle Thames area (range)	0.575 – 0.614	0.610 – 0.707	0.297 – 0.361	0.514 – 0.581	0.26 – 0.35	14.29 – 18.61
East Anglia area.						
Keswick	0.605	0.714	0.348	0.452	0.39	4.79
Barnham Heath	0.646	0.769	0.376	0.550	0.23	15
Thetford	0.605	0.630	0.310	0.503	0.27	8.56
RANGE.	0.605 – 0.646	0.630 – 0.769	0.310 – 0.376	0.452 – 0.550	0.23 – 0.39	4.79 - 15

Typological comparison of these sites was hampered by the small sample size for the Keswick assemblage, and the lack of comparable data for the Whitlingham sample. The typological makeup of the Keswick assemblage was nevertheless unusual, with a complete absence of crude types, and a superabundance of cleaver types (H = 29.17%). Collection bias may partially explain the skew towards impressive (and large) types here as the site was never formally excavated (Roe 1981). Typologically Thetford was typical of the Middle Thames Group IA sites, in that it was dominated by pointed types along with larger crude types, and a diverse range of other types including ficrons and cleavers. Barnham Heath was not a close metrical or typological match to either Group IA or Group IB sites. The site was characterised by exceptionally large, massive and crude handaxes. Some of these were undoubtedly proto-handaxes or roughouts (type C); when they were removed from the analysis, the average elongation and tip shape shifted closer to the range of Group IA (B/L=0.632, B1/B2=0.735), although Barnham Heath still does not make a convincing addition to the group. It is likely that some additional proto-handaxes were retained in the analysis as large, crude types, which formed an unusually large part of the sample (D = 28.77%). The proportion of cleavers, which also tended to be heavy and massive, was also very large (H = 21.92%).

A typological comparison of the East Anglian sites is shown in figure 6.16.

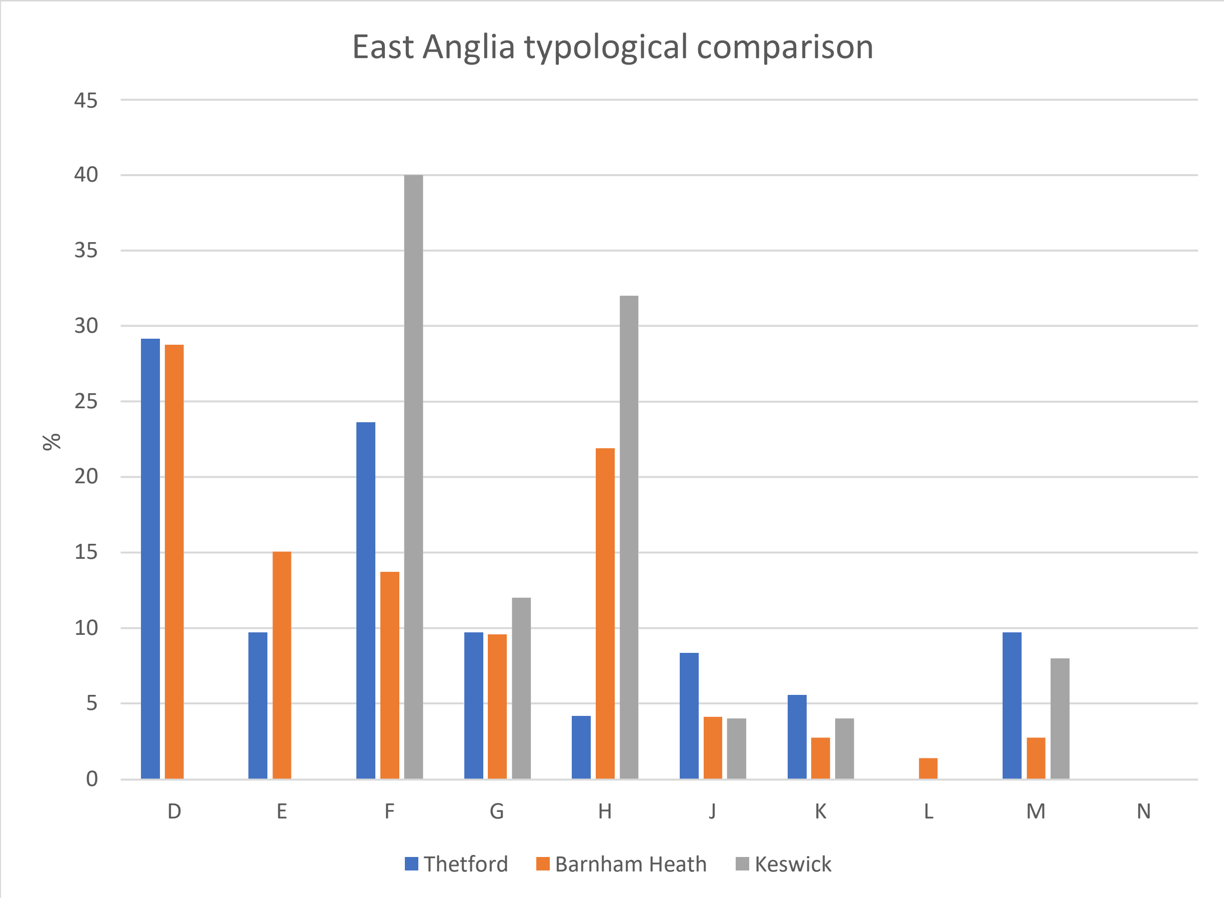


Figure 6.16. A comparison of the typology of sites in East Anglia. A tendency towards 'heavy duty' tools might be suggested based on the high incidence of type D handaxes at Thetford and Barnham Heath, and for type H handaxes at Barnham Heath and Keswick. 10 type C 'proto-handaxes' were also identified from Barnham Heath (not shown above); these extremely heavy artefacts may represent rough-outs.

Two other sites in East Anglia may be relevant to this discussion. Southacre, Norfolk, was situated on the highest terrace of the river Nar (Wymer 1999) and is an interesting addition to the picture of the Acheulean in East Anglia as it has a significant proto-Levallois assemblage which has been used to suggest an MIS 9/8 age by analogy with the Thames terraces (Wymer 1985; MacRae 1999; Bridgland 2006; Boreham et al., 2010; Bridgland & White 2014). A Clactonian industry was also reported at Southacre although it is unclear whether the cores and flakes were stratigraphically separate from the Acheulean component: the fluvial gravels from which the artefacts were found were in any case unbedded and contorted, and the artefacts may have originated from several nearby gravel pits (Wymer 1985). Wymer (1985) produced the only published typological description of the Southacre assemblage (reproduced below in figure 6.17). He drew attention to the almost complete absence of ovate and cordate types, but the occurrence of a high proportion of 'cleaver-like implements' (i.e., cleaver tips on ovate and sub-cordate planforms, type GH and HK) was noted. These far outnumbered the 'true' (type H) cleavers at the site, of which Wymer identified only a single example. Most of the handaxes were found to be pointed, with only a small number of small, crude (type E) handaxes. This at least suggests a similarity to the Group IA sites, and the high proportion of cleavers, reminiscent of Keswick and Whitlingham, perhaps hints at a more localised pattern. The lack of ficrons at Southacre may indicate a notable difference between that assemblage and other Group IA assemblages, although comparison of Wymer's typological analyses with the present study certainly suggests that he was conservative in classing handaxes as ficrons compared to the present author (see section below) (Wymer 1968, 1985).

Snare Hill, Norfolk may also be pertinent to discussions of regional culture in East Anglia. The site was located around 1.6km from Thetford, 183m from the left bank of the river Thet (Clarke 1906). Wymer (1985) was unable to relocate the site and consequently no geological context is known. It must be stressed that there is no independent evidence for the age of the handaxe assemblage, however the similarity of Wymer's typological analysis (shown below in figure 6.17) to Whitlingham and Southacre is notable. Interestingly, Wymer suspected that the seven small, crude (type E) handaxes provenanced to Snare Hill were from a different provenance, based on their more abraded condition and distinctive patination. This would suggest that the fresher fraction of the assemblage aligned closely with the other East Anglian sites, and with Group IA.

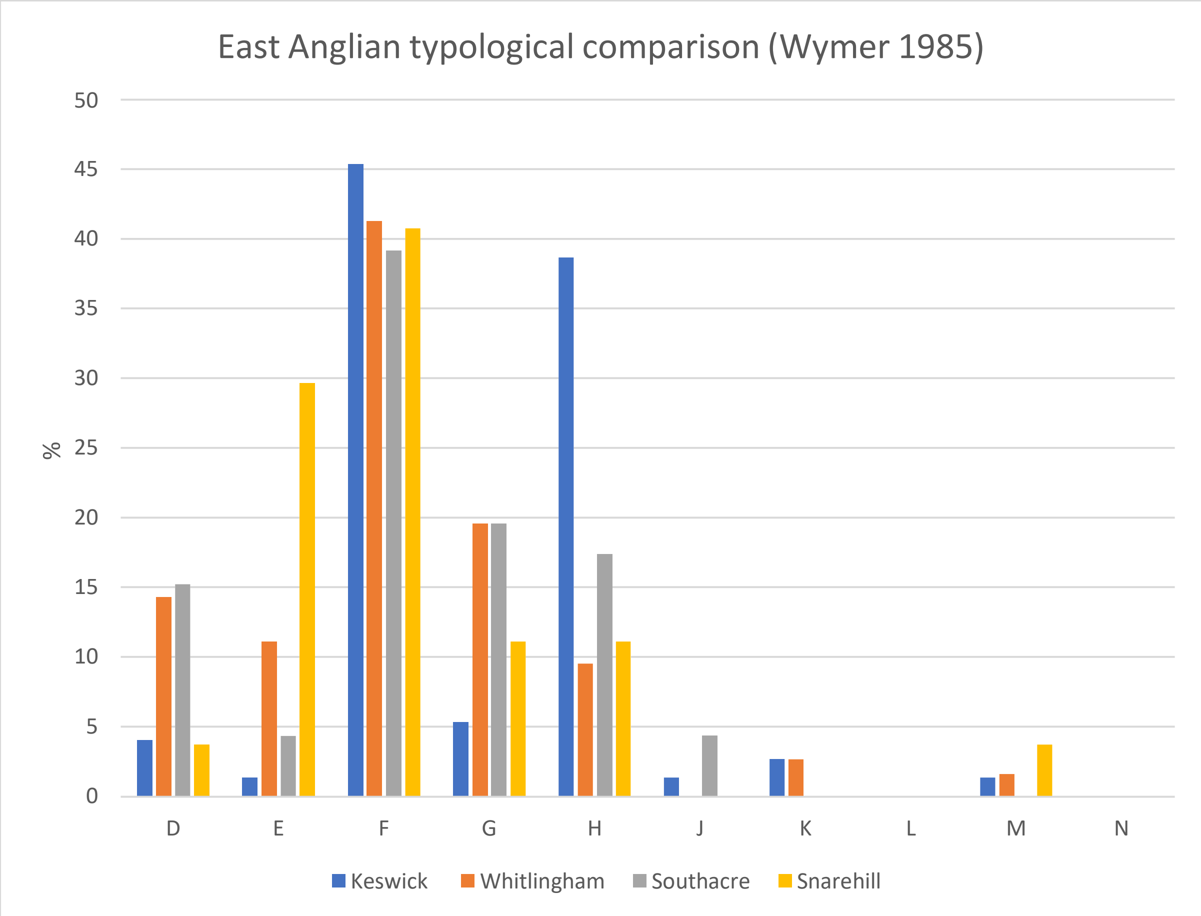


Figure 6.17. A comparison of the typology of sites in East Anglia using data from Wymer (1985). The usual preference for pointed (type F) handaxes is evident; the extremely high proportion of cleavers (especially at Keswick and Southacre) is notable and agrees to some extent with the results from the present study.

6.10. The Solent.

Sorting of sites in the Solent region revealed an interesting tendency for the handaxe assemblages to fall into either Group IA (Roe's Group I; pointed, with cleavers) or Group IV (generalised, with ovates and cleavers). Dunbridge mapped close to Group IB in metrical terms, but examination of the condition of the Dunbridge handaxes suggested a bimodal distribution. Furthermore, there was a clear difference in morphology and typology between the fresher and more rolled parts of the assemblage, strongly suggesting that the Dunbridge assemblage was a multi-period mixture; Davis et al., (2021b) also noted the mixed character of the rolled component of the Dunbridge handaxe assemblage.

Warsash and Milford Hill align with Group IA in average morphometric terms. No typological analysis was available for Milford Hill, however illustrated examples in Egberts (2016) point to a similarly point-dominated assemblage with demi-ficron (FM) handaxes, pointed crude types, and cleaver types; the figured examples are reminiscent of the Cuxton handaxes, in that their form appears to be designed around the natural form of the blank (examples shown below in figure 6.18 from Egberts (2016)).

Figure 6.18. No typological analysis is available for Milford Hill, however illustrated examples in Egberts (2016) point to a similarly point-dominated assemblage with demificron (FM) handaxes, pointed and crude types, and cleaver types; the figured examples are reminiscent of the Cuxton handaxes, in that their form appears to be designed around the natural form of the blank. Photographs by E. Egberts.

In typological terms, the Warsash assemblage showed close similarity to Group IA, being strongly dominated by pointed types accompanied by a wide diversity of numerically less important types (including ficrons and cleavers)**.** The relatively large proportion of ovates (type K) at Warsash may represent inter-period mixing; ovate and crude handaxes at Warsash are disproportionately well represented in the more abraded condition categories, whereas the fresher component is closer to the ‘typical’ Group IA Thames sites*.* Likewise, the fresher half of the Dunbridge assemblage was dominated by pointed types; again, there was a large proportion of rolled ovates which almost certainly represented the mixing of older material in this case. The probable inter-period mixing at

Dunbridge, and to a lesser degree at Warsash, may be related to the 'significant' derivation of artefacts from higher to lower terraces in the Solent region (Ashton & Hosfield 2010).

Harnham, Wiltshire (SU 152 278) may also align with Group I. Archaeological evaluation carried out in advance of construction at Harnham in 2002 and 2004 revealed deposits interpreted as a relatively undisturbed human occupation site, including a handaxe assemblage in addition to evidence of butchery on animal bones (Bates et al. 2014). The archaeology was preserved in cold-climate fluvial terrace sands and gravels abutting a chalk riverbank, a situation comparable to Purfleet (Bridgland et al. 2013; Bates et al. 2014). The dating of the Harnham terrace deposits is relatively robust, based on a combination of OSL and AAR values from *Bithynia tentaculata* opercula, along with biostratigraphic indications from the limited fauna pointing to a late MIS 8 age (Bates et al. 2014), although Pettitt & White (2012) suggested that the archaeology predates the deposits themselves, perhaps having been emplaced *en masse* by downslope movement. The Harnham archaeological assemblage included 36 handaxes: refitting elements were also found, pointing to either a primary or minimally reworked secondary context site. The typological description provided by Bates et al. (2014) suggests similarities with the typological makeup of other well-studied MIS 10 – 8 sites, including a dominance of pointed types with large ficrons, sub-cordate types, and tranchet sharpened cleavers. No morphometric data are available from Harnham, but the typological makeup is similar to Group IA assemblages.

There are several additional candidates for Group I attribution in the Solent region, summarised in Roe (1981). The Bournemouth and Southampton areas were found to be particularly prolific, although finds were generally diffused throughout the area in a number of findspots rather than large 'sites' (Roe 1968b; Roe 1981). Westaway et al. (2006) suggested the Taddiford Farm Gravel in the Bournemouth area dated to MIS 9-8 based on the occurrence of Levallois in that terrace, although this is contested by Ashton & Hosfield (2010) as Levallois artefacts also occur on higher terraces. Davis (2014) suggested that the archaeology from Foxholes, Bournemouth may date to MIS 7 or MIS 9, although the sediments there probably formed in MIS 6. Regrettably, no detailed morphometric or typological analysis of any of this material is available, so no interpretation can be made here.

The integrity of Group IV has been challenged, on the grounds that sites such as Barton-on-Sea and Wallingford probably represented mixed assemblages (e.g., by Roe 1981; Bridgland & White 2018). Group IV is resurrected here as a relatively small number of sites which show 'uncommitted' planform preferences, with assemblages featuring both points and well-made ovates along with cleavers. Five of Roe's original sites formed Group IV: Santon Downham, Wallingford, Broom, Shide

(Great Pan Farm) and Barton Cliffs. Of the sites presented in this study, Bemerton and Woodgreen showed a close affinity to Roe's Group IV in morphometric terms, although a typological analysis was regrettably not available for these sites. The figured examples in Egberts et al. (2019) include both well-made ovate and pointed examples, along with a wide-butted ficron from Woodgreen although there was no suggestion that this was a representative sample. Broom is also close enough in terms of average elongation and tip shape to be considered part of this group, in addition to showing a 'generalised' typology with well-made ovates and cleavers which would appear to be typical of the group, although the unique occurrence of a large proportion of 'lopsided' handaxes at Broom may argue for its treatment as a distinct group (Green & Hosfield 2013). The remaining sites from Roe's original study are outlined briefly below.

Barton-on-Sea (Hampshire, SZ 230 930) produced a large but heavily rolled handaxe assemblage which Roe (1968a) suggested originated from a single thin gravel band capping the sea cliffs, an interpretation supported by descriptions of fresher implements *in situ* within that gravel body (Evans 1897). That said, Evans (1897) also implied that the artefacts recorded as having come from Barton may have originated from a long stretch of coastline from Chewton Bunny to Milford-on-Sea (Ashton & Hosfield 2010), which would clearly introduce the potential for a mixed assemblage. The site was OSL dated by Briant et al. (2009) to MIS 11 – 9 and is therefore potentially chronologically relevant to this study. They suggested that the proportion of twisted ovates ('at least 12%' according to Roe's (1968a) analysis) was not sufficient to be diagnostic of an MIS 11 age, in line with the similar observations made of the Broom handaxe assemblage (Hosfield et al., 2013b). The extremely insecure provenance of the artefacts and relative lack of metrical cleavers argue for caution in interpreting this assemblage 'at face value', although the distinct morphometric similarities with other Solent sites may advocate for its (re-) inclusion within the putative Group IV.

Shide (Great Pan Farm), on the Isle of Wight, Hampshire (SZ 507 884) was originally collected and described by Poole (1925). The site consisted of a sequence of fluvial terrace gravels containing marine sands (Hosfield et al. 2009). The site has been tentatively dated to MIS 7 based on the possible stratigraphic correlation of the deposits with the Norton Farm – Brighton raised beach (Bates et al., 2000; White & Jacobi 2002), although earlier age estimates ranged from MIS 3 to MIS 9 (Emery 2010). Whilst Roe (1968) found Shide to have an affinity to his Group VI (ovate tradition, more pointed), Emery (2010) re-assigned it to Group IV based on a larger sample size which showed more generalised morphological preferences including cleavers. There is no reason to necessarily assume that the Shide artefacts pre-date the deposits in which they were found based on their relatively fresh condition (Poole 1925), although the presence of *bout coupé* handaxes certainly suggests some degree of mixing of artefacts of different ages.

One further site which may be salient to this discussion is Highfield, Hampshire. Although Roe (1981) had suggested that the Highfield handaxe assemblage had some affinity for Group I, Wenban-Smith's (2001) assessment showed a greater variability in type (shown below in figure 6.19 and 6.20), amounting to 'distinctive features absent in the Thames sequence' which he suggested could point to regional cultural variation. Unfortunately, no morphometric data were published for Highfield, so its attribution to Group IV must remain tentative. The presence of both ficrons and cleavers is notable, but the typology described for Highfield does not closely match that of Broom, the latter site having a far greater proportion of ovate-cordate types. The almost complete lack of crude types mirrors the Broom assemblage, however, which may be notable as these types appear at almost every other purported MIS 9 site in this study. Wenban-Smith noted two 'technological quirks' which are worth mentioning; the first is the presence of an un-worked, elongated butt on some pointed and sub-cordate examples (comparable to the 'grip' attribute recorded in this study and discussed fully below, and previously noted at Highfield by Dale (1896)), and the second the use of 'Levalloisian-like flakes' as blanks for three unifacial handaxes.

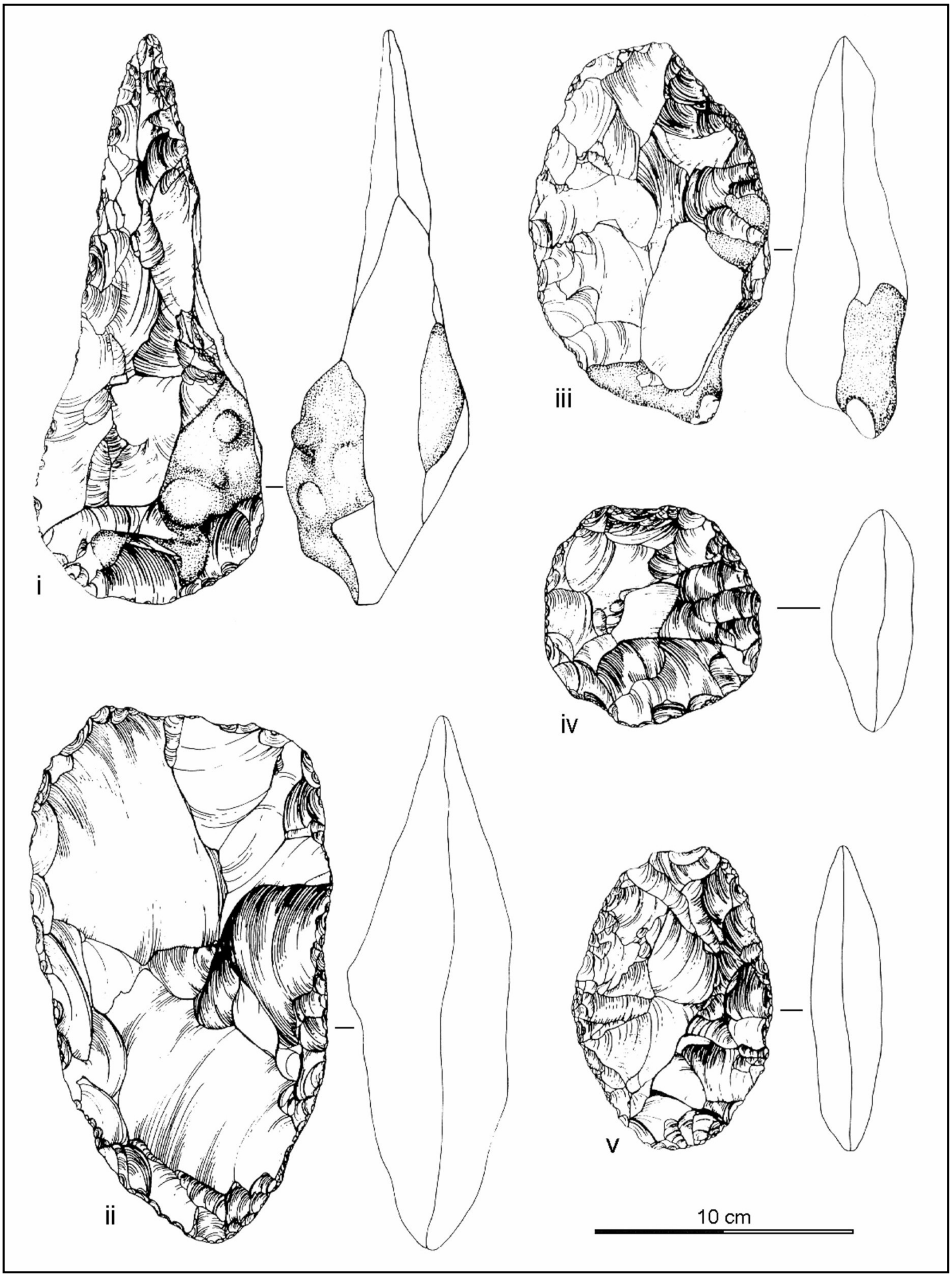


Figure 6.19. An illustration of the diverse types found at Highfield, including (i) a ficron, (ii) a large cleaver, (iii) a sub-cordate with 'elongated butt' (oblique corticated section lower right), (iv) and (v) refined ovates. The discoidal handaxe (iv) may be the resharpened butt of a ficron; other examples of ficron butt fragments identified in other assemblages had similar shapes (discussed below), although none were resharpened. From Wenban-Smith (2001), Fig. 6.3, p.65, figures drawn by Barbara McNee.

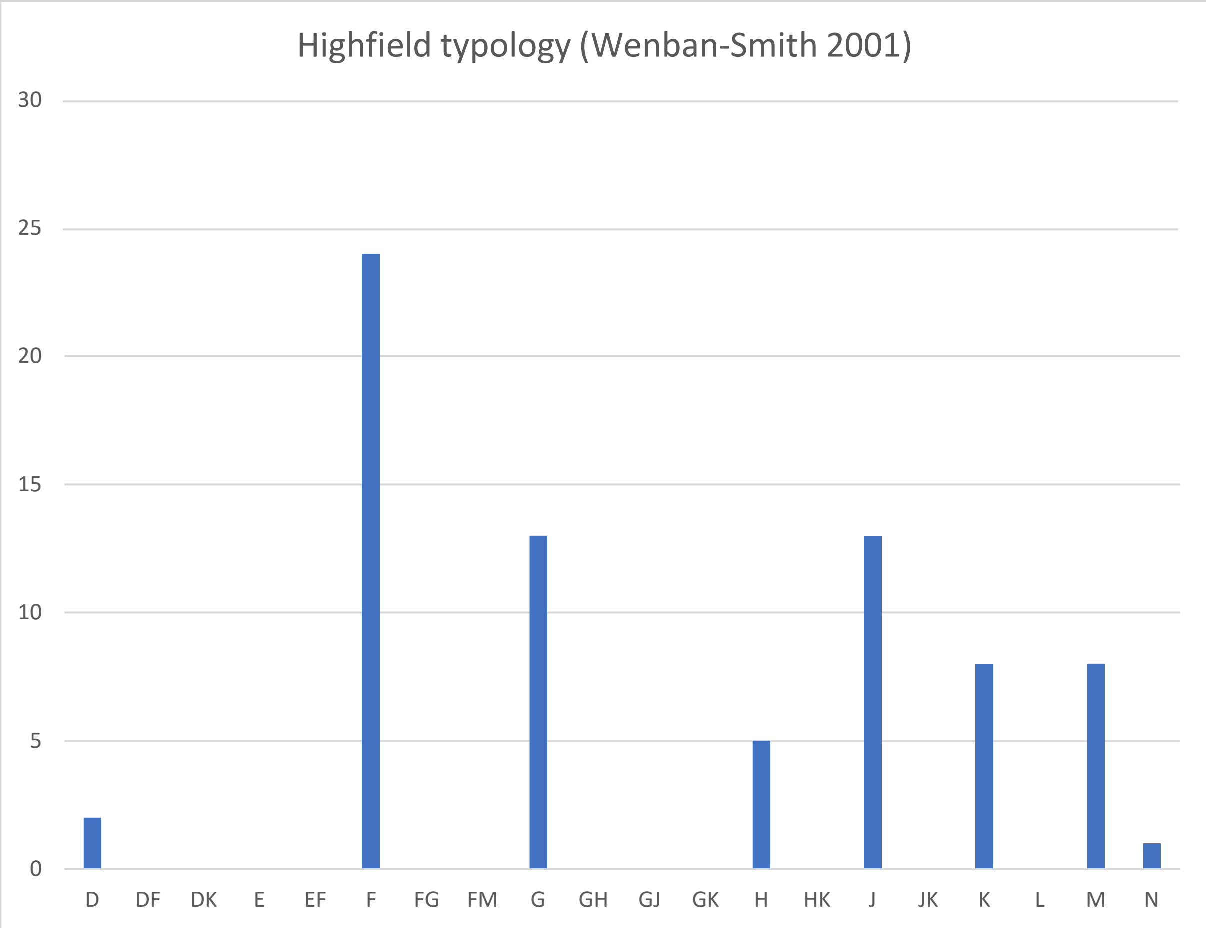


Figure 6.20. Wenban-Smith's typological analysis of the Highfield handaxe assemblage (Wenban-Smith 2001). The combination of ficrons and cleavers with relatively abundant ovates and cordates points to a generalised industry, comparable to Broom and Roe's Group IV. Wenban-Smith used this diversity of type to suggest a regional handaxe culture distinct from the Thames terrace sequence.

Any interpretation of the Group IV sites must consider the potential for multi-period assemblages, especially considering the nature of the group (i.e., generalised industries with a wide range of types represented). This is an appropriate point to return to the two errant Group IV sites outside of the Solent. The integrity of the Wallingford fan gravel assemblages may be immediately challenged, as the Wallingford 'site' extends over 11km and handaxes were collected from at least four pits (Arkell 1945; Roe 1968a; White in press). The thick gravel spread was probably the result of soliflucted material running off the Chilterns, and Roe (1968a) thought that the Wallingford assemblage did not represent 'a single closed group, in the sense of a true industry'. Santon Downham, Suffolk, a post-Anglian (presumed MIS 11) site (White et al. 2019), was also considered to represent a mixed assemblage due to its distinctly mixed morphological and typological preferences (Roe 1968a; Wymer 1985) and the presence of a Levallois flake and a *bout coupé* handaxe (White 1997). Single examples of *bout coupé* handaxes were also found at Great Pan Farm (White & Jacobi 2002) and Highfield (Wenban-Smith 2001) and are almost certainly evidence of some degree of multi-period mixing, although they need not suggest a degree of mixing which would greatly affect morphometric averages. The nature of the collection of artefacts from Barton (*ex situ* from the base of the cliffs) leaves open the possibility of a mixed assemblage, although again this need not be assumed.

Ashton & Hosfield (2010) suggested that, in the Bournemouth area, a 'significant number of handaxes were derived from higher terraces into lower terraces'. This was identified in the Dunbridge handaxe assemblage and to a lesser extent in the Warsash assemblage and may consequently be assumed elsewhere in the Solent. There is no suggestion of a high degree of multi-period mixing at Broom or Bemerton, which may be considered the 'core' of the rehabilitated Group IV, but Woodgreen was noted as an unusual example of a dense artefact assemblage containing a high proportion of highly abraded artefacts (Hosfield 2011a), pointing at least to post-depositional movement and potentially mixing. The validity of Group IV as a distinct group would rely on a detailed typological and taphonomic analysis of the Bemerton and Woodgreen handaxe assemblages, which would be an interesting avenue for future research building on the work of E. Egberts (2016; Egberts et al., 2019, 2020).

The position of Broom in relation to the other Solent sites, and indeed to Roe's Groups, is unclear. Whilst Roe sorted Broom into his uncommitted Group IV, the data presented by Hosfield et al., (2013b) indicated an ovate-dominated assemblage. Broom does not appear closely like the other sites in Group IV in morphometric terms (see figure 5.6), although it is closer in character to Group IV than any other group and the typological makeup is certainly 'generalised', with points, ovates, ficrons and cleavers all represented. Unlike the other suggested Group IV sites, there is no suggestion of a mixed assemblage; in fact, the archaeology is fresh and probably minimally moved (Roe 1968a; Wymer 1999; Hosfield et al., 2013c). The raw material used at Broom for handaxe manufacture was overwhelmingly chert (~97%) rather than flint (Green 1988), a point which makes direct comparison with other (flint dominated) handaxe assemblages slightly questionable, although fine-grained chert is by no means an intractable raw material and should not be assumed to be a limiting factor. The presence of a high proportion of macroscopically asymmetrical 'lopsided' handaxes at Broom sets it apart yet further from the other members of Group IV, a feature which will be examined in detail in the following chapters. It might be appropriate to consider Broom its own 'group' due to these unique features which are not found widely elsewhere, although (as will be discussed below), the relatively short time span represented by the assemblage must be taken into account (c.f. Wolvercote, which may also have represented a relatively brief span of time).

The site at Red Barns, Portchester, (SU 608 063) is not a clear fit for either Group I or Group IV and is instead one of the very few sites suggested as an analogue for Wolvercote (Group III). The site was found to preserve a fresh Acheulean assemblage including both handaxes and debitage, in addition to limited organic preservation, making it exceptional compared to the reworked fluvial aggradations commonly found in the palaeo-Solent catchment. Excavations carried out in 1975 recovered a small assemblage of handaxes dominated by 'Wolvercote type' plano-convex pointed types, in addition to abundant debitage, a handful of flake tools, cores, and a single bipolar Levallois core. The main archaeological horizon occurred in a grey loam towards the base of a sequence of chalky breccias and fine-grained sediments, itself overlaying a basal chalk rubble with a more limited archaeological assemblage. The grey loam appears to have been deposited during a cold period, indicated by prevalent frost-fracturing in the archaeological assemblage, followed by a limited climatic amelioration indicated by generally high levels of molluscan species diversity (Wenban Smith et al. 2000). The preferential manufacture of 'Wolvercote-type' plano-convex handaxes at Warsash, albeit in smaller numbers at that site, may also be significant to interpreting Red Barns in the wider context of British handaxe variability in the terminal Lower Palaeolithic.

AAR dating of mollusc shells from immediately above the implementiferous strata yielded dates in the range of MIS 11 – 7. Wenban Smith et al. (2000) considered the MIS 10 – 9 transition to be most likely age within that range, at least in part based on Bridgland's (1994) dating of Wolvercote. The presence of a Levallois core might be more likely to point to the MIS 9 – 8 transition based on the current understanding of the emergence of that technology (e.g. White & Ashton 2003; Westaway et al. 2006; Bridgland et al. 2013), in which case a date of MIS 9b – 9a might be suggested to fit with climatic evidence. However, it would be incautious to rely on a single artefact which, as Wenban Smith et al. (2000) state, can occur by chance at almost any time in the Lower Palaeolithic (although the recent synthesis of evidence by Rawlinson (2021) would certainly support the suggestion that Levallois technology because more widespread and stable in MIS 9). It is also worth considering that the timing of the emergence of Levallois technology in the Solent region is far from clear (Ashton & Hosfield 2010).

A summary of the possible MIS 9 sites in the Solent, along with their handaxe shape affinities, is given below in table 6.6.

Table 6.6. A summary of the characteristics of handaxes at the assemblage level at potential MIS 9 sites in the Solent.

Site	Age of deposits	Roe Group	Notes
Dunbridge	MIS 10 – 8	Mixed (I/II?)	Probably a reworked older (MIS 11?) assemblage with a smaller (MIS 9?) component, possibly the result of the offloading of clasts at

			the interface between chalk and Tertiary underlying geology (Ashton & Hosfield 2010).
Warsash	MIS 10 – 8	I	Possibly also mixed to a lesser extent.
Milford Hill	MIS 10 – 8	I	Late MIS 8 (contemporary to Harnham) suggested based on OSL dates and long profile correlation in Egberts et al. (2020), although the rolled condition of the assemblage may suggest derivation (Roe 1981).
Bemerton	MIS 10 or earlier	IV	Pre-MIS 10 based on OSL dates in Egberts et al. (2020).
Woodgreen	MIS 10 – 9	IV	'At least' MIS 10 – 9 based on OSL dates in Egberts et al. (2020). Possibly also contains reworked artefacts (Hosfield 2011a).
Broom	MIS 9 – 8	IV (with unique characteristics)	Hosfield & Green (2013).
Great Pan Farm (Shide)	MIS 7	VI (Roe 1968); IV (Emery 2010)	Moved from Group VI to Group IV based on Emery's evaluation of a larger sample of handaxes (Emery 2010).
Harnham	MIS 8	I?	Dated to MIS 8 by Bates et al. (2014); Pettit & White (2012) suggest that the archaeological assemblage derives from MIS 9.
Red Barns	MIS 10 – 8	III?	Plano-convex handaxes suggest a similarity to Wolvercote (Wenban-Smith et al., 2000), although the validity of Group III as a distinct cultural expression is contested here.
Highfield Church Pit	MIS 11 – 9?	IV?	Roe (1981) considered Highfield Church Pit, Southampton, as a

			possible Group I attribution. Wenban-Smith's (2001) description suggests a Group IV attribution.
Barton Cliffs	MIS 11 – 9?	IV	Age based on OSL dates from Barton Cliffs, although there is a potential for multi-period mixing.

6.11. Regional patterning in MIS 9?

Having framed the morphometric and typological characteristics of each site within the context of other sites in the same region, several patterns can be suggested. Sites aligning closely to Roe's original Group I (sub-group IA in the present study) were found to be widely spread across southern Britain, occurring in the Middle Thames, Stour/Medway, East Anglia, the Solent and potentially in the Upper Thames. Sites resembling Roe's original Group I, but with generally smaller and less elongated handaxes (sub-Group IB in the present study) were found in the London area around Stoke Newington, and less securely in the Great Ouse. The possibility of a 'generalised' Group IV pattern in the Solent remains unconfirmed due to the high potential for inter-period (vertical) mixing in that area but is certainly suggested by descriptions of Highfield. Broom appears to be a unique occurrence, distinct even from other putative Group IV sites; the lopsided handaxes which make up a significant percentage of its assemblage will be discussed further below. Wolvercote was found to be less distinct from Roe's Group I in purely metrical terms than previous studies had suggested; the defining feature of that assemblage was the occurrence of a small but significant number of plano-convex handaxes, which were also identified at a handful of other sites with a generally western distribution. These factors, along with a debate of whether Wolvercote merits assignment to its own group (Group III), are also discussed further below.

- *Group IA and IB in the Thames.*

The results presented in the results chapter and summarised below show subtle but consistent differences between the large London area Acheulean sites, epitomised by Stoke Newington, and the large Middle Thames sites such as Furze Platt. To briefly summarise, the London area handaxes (Group IB) generally showed a preference for broadness, often with a greater proportion of metrical ovates. Handaxes were also typically smaller on average. The distinction between the two sub-groups was less apparent in typological terms, however Group IB sites often had a larger proportion of small, crude (type E) handaxes (particularly at Stoke Newington and Lower Clapton). In contrast, the Middle Thames sites (Group IA) were characterised by narrower handaxes with a greater proportion of metrical points and were often typologically dominated by pointed types (type F) although often with significant numbers of both larger and smaller crude types. Both groups shared the supposedly chronologically significant pairing of ficrons and cleavers in variable proportions. The Group IA and IB sub-groups in the Thames are reasonably well defined in morphometric terms: only Hillingdon among the Thames sites occupies an intermediate position between the two groups in terms of elongation (and perhaps significantly, in terms of its geographical position).

Roe (1968a, 1981) noted that the Stoke Newington handaxe assemblage was different from the other Group I sites, particularly in terms of the smaller average size of handaxes but was unable to justify the creation of a sub-group (probably due to the small number of sites in his Group I). The shift in dominant type from the Lower Thames/ London area and the Middle Thames can be seen clearly in Wymer's (1968) analysis. Wymer recorded handaxe types according to his own typological scheme along with size and condition observations. His size descriptions provided a simple way of comparing the prevalence of both small (<127mm) and large (>178mm) handaxes in an assemblage by tallying handaxes which were less than 5 inches in length, and more than 7 inches in length. Sites were selected from Wymer's work for reanalysis based on their secure Lynch Hill/ Corbet's Tey terrace provenance, and for their large sample sizes. Purfleet is included due to the prominence of the site in interpretations of MIS 9, although the sample consisted of only nine handaxes. The percentages of Wymer's samples falling into the larger and smaller length categories are shown below in figure 6.21.

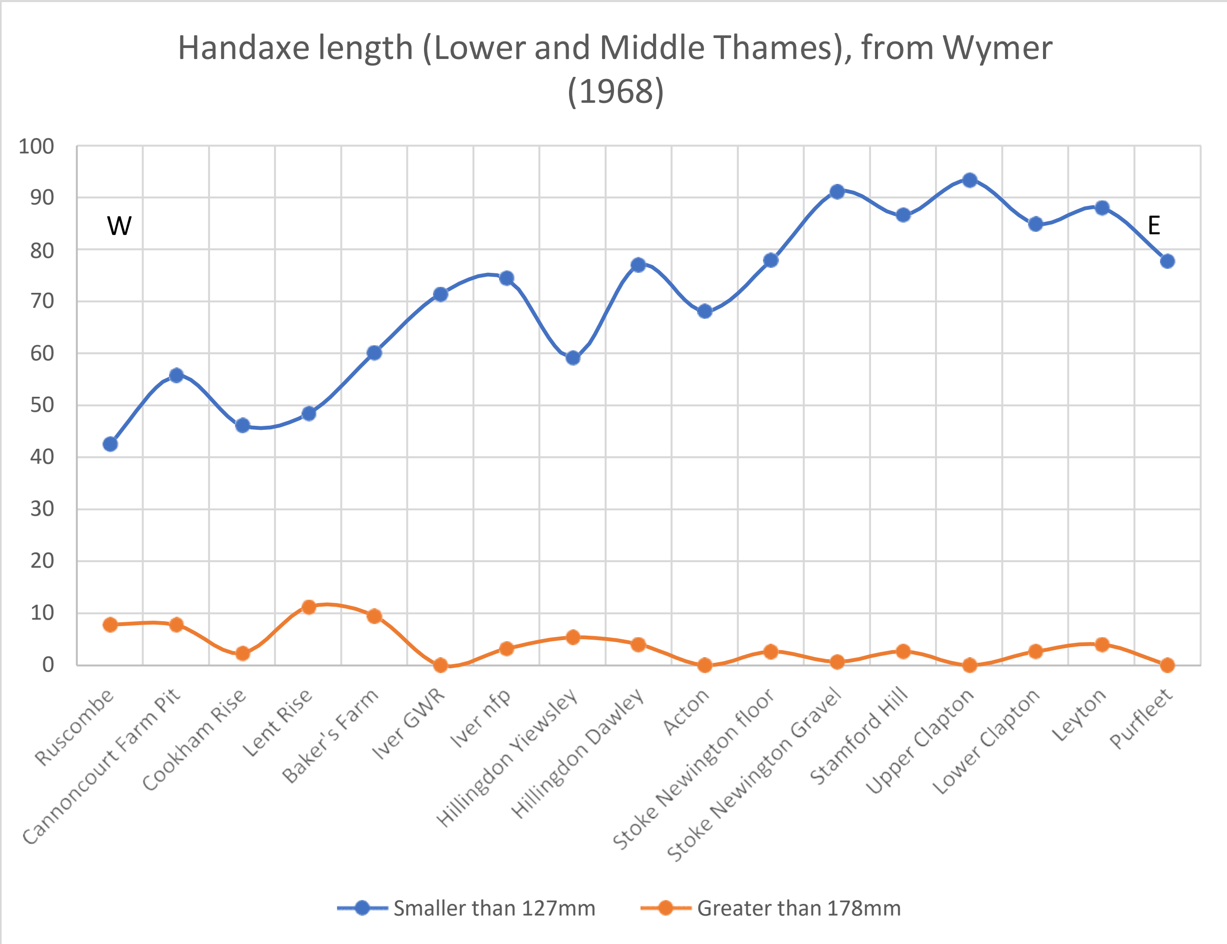


Figure 6.21. A comparison of large handaxe assemblages on the Lynch Hill terrace, arranged approximately west to east, showing changes in handaxe length preference (as a proxy for size), using data from Wymer (1968).

Wymer's data strongly suggest that the number of small handaxes increases from west to east; the number of very large handaxes is generally low across all sites, but greater at the Middle Thames sites than the London area sites. The same trend was present, although far less pronounced in the data gathered by the present author, with Cookham and Lent Rise in particular having a greater proportion of small handaxes when compared to Wymer's data from the same sites (figure 6.22).

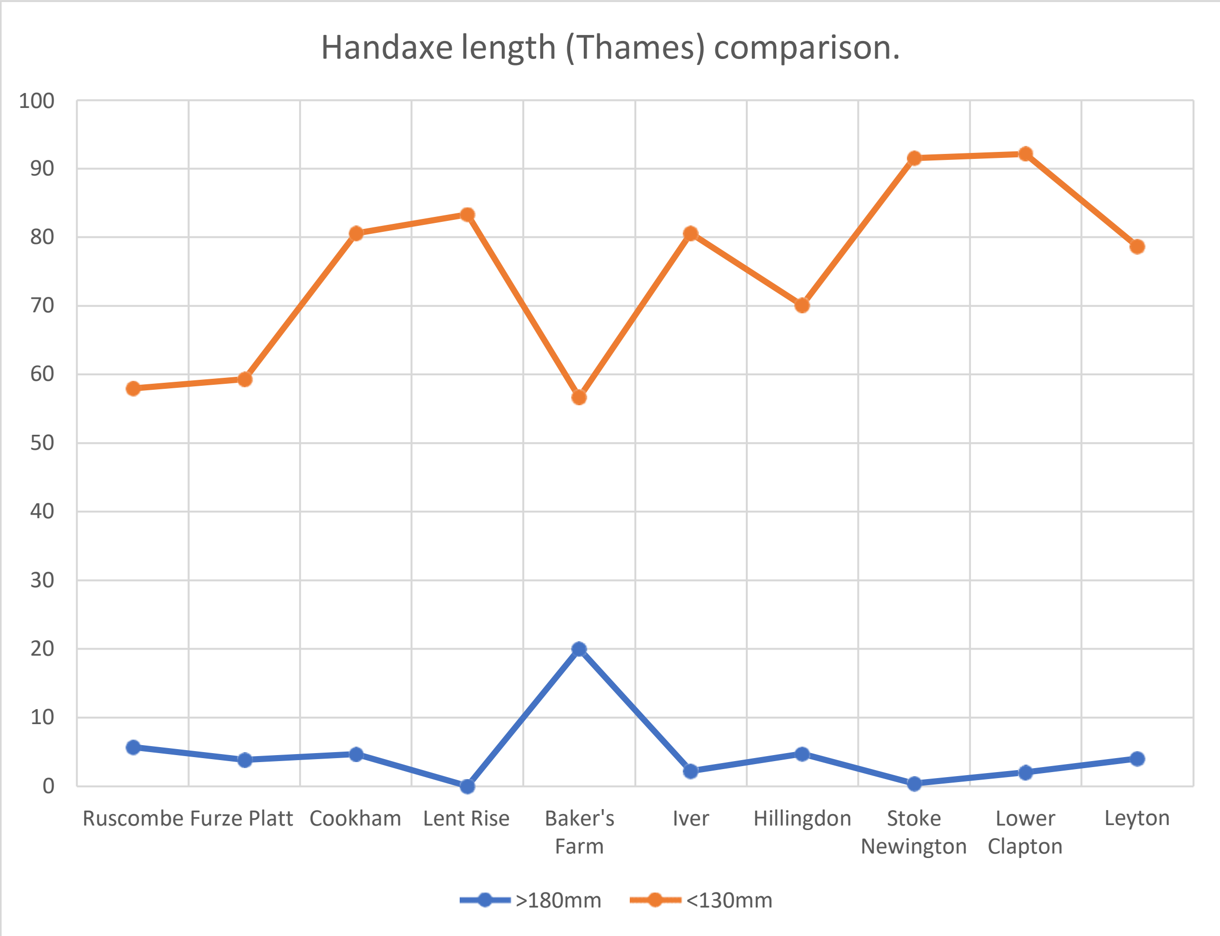


Figure 6.22. A comparison of handaxe assemblages on the Lynch Hill terrace, arranged approximately west to east, using data from the present study.

A similar pattern can be seen when assessing Wymer's typological data, shown in figure 6.23. In this case, the sum per-centage of 'crude' types (D, DF, DK, E, EF) was compared to the sum per-centage of 'pointed' types (F, FG). A trend from fewer crude handaxes to more crude handaxes is seen from west to east; the opposite is true of pointed handaxes. Again, the trend was less pronounced in the data collected in this study; small, crude handaxes were found to be common across all sites. This may be explained by inter-analyst variation, one of a number of instances where the present author's judgement of type differed from Wymer's own. Wymer was seemingly reticent to assign handaxes to intermediate or hybrid categories (e.g., EF, FG, GK), which the present author did quite freely. Wymer was also less likely to assign a handaxe to his type D (large crude) than his type E (small crude), and far less likely to assign a handaxe to his type M (ficron) category than the present author (a point discussed further below).

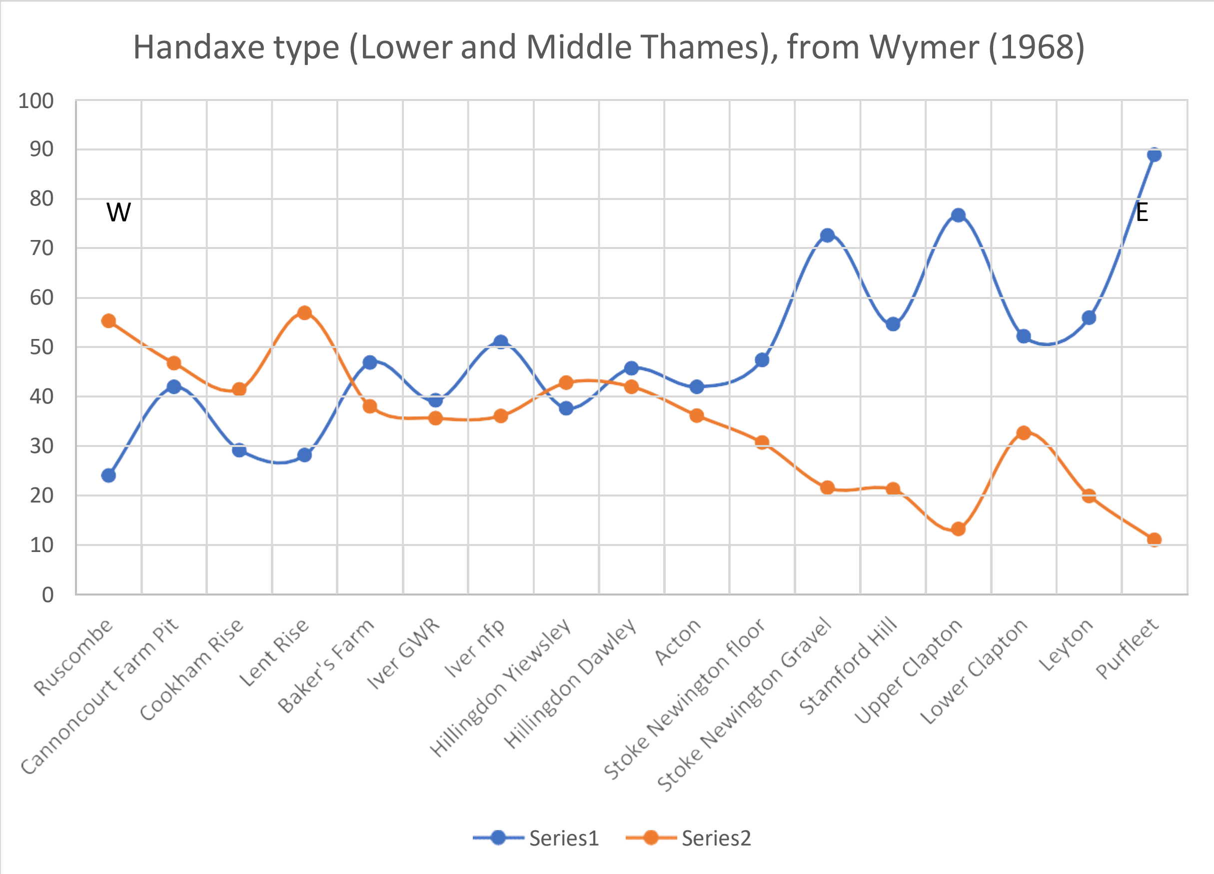


Figure 6.23. A comparison of large handaxe assemblages on the Lynch Hill terrace, showing the relative proportions of pointed types (orange) and crude types (blue). Sites arranged approximately west to east, based on data from Wymer (1968).

The complete typological data presented in the results chapter suggests similar patterns, although again less clearly: Iver and Lower Clapton resemble Stoke Newington, with far more type E handaxes than type F handaxes. Furze Platt is alone in the Thames sites in having a very pronounced preference for type F handaxes over type E. The other Thames sites appear typologically intermediate between Stoke Newington and Furze Platt, with both pointed and crude types well represented (figure 6.24).

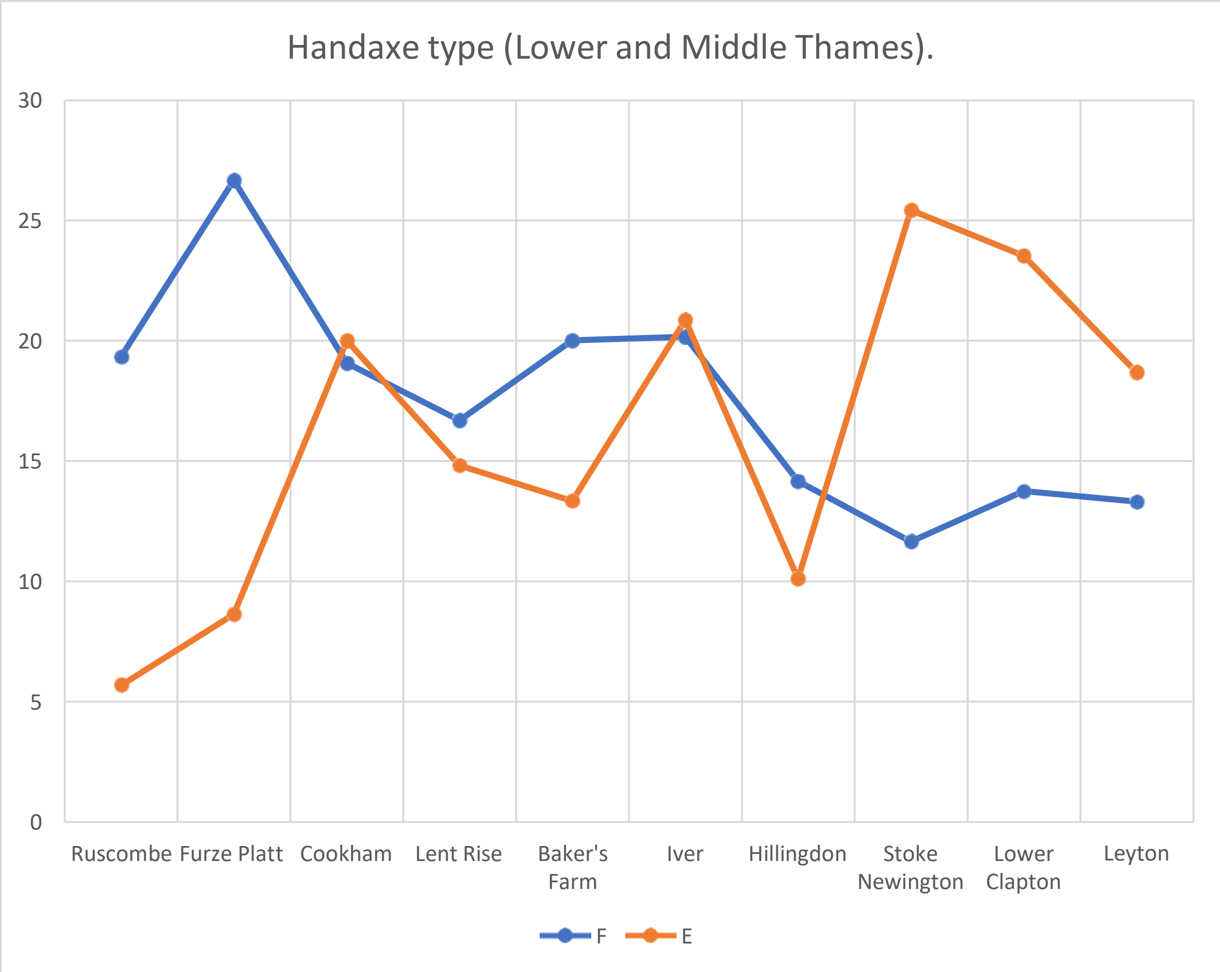


Figure 6.24. A comparison of handaxe assemblages on the Lynch Hill terrace, showing the relative proportions of pointed types (orange) and crude types (blue). Sites arranged approximately west to east.

McNabb (2007) presented a comparable typological analysis of Thames sites, again showing a west to east increase in the number of pointed types 'with little to no shaping' (i.e., crude types). This is reproduced in figure 6.25.

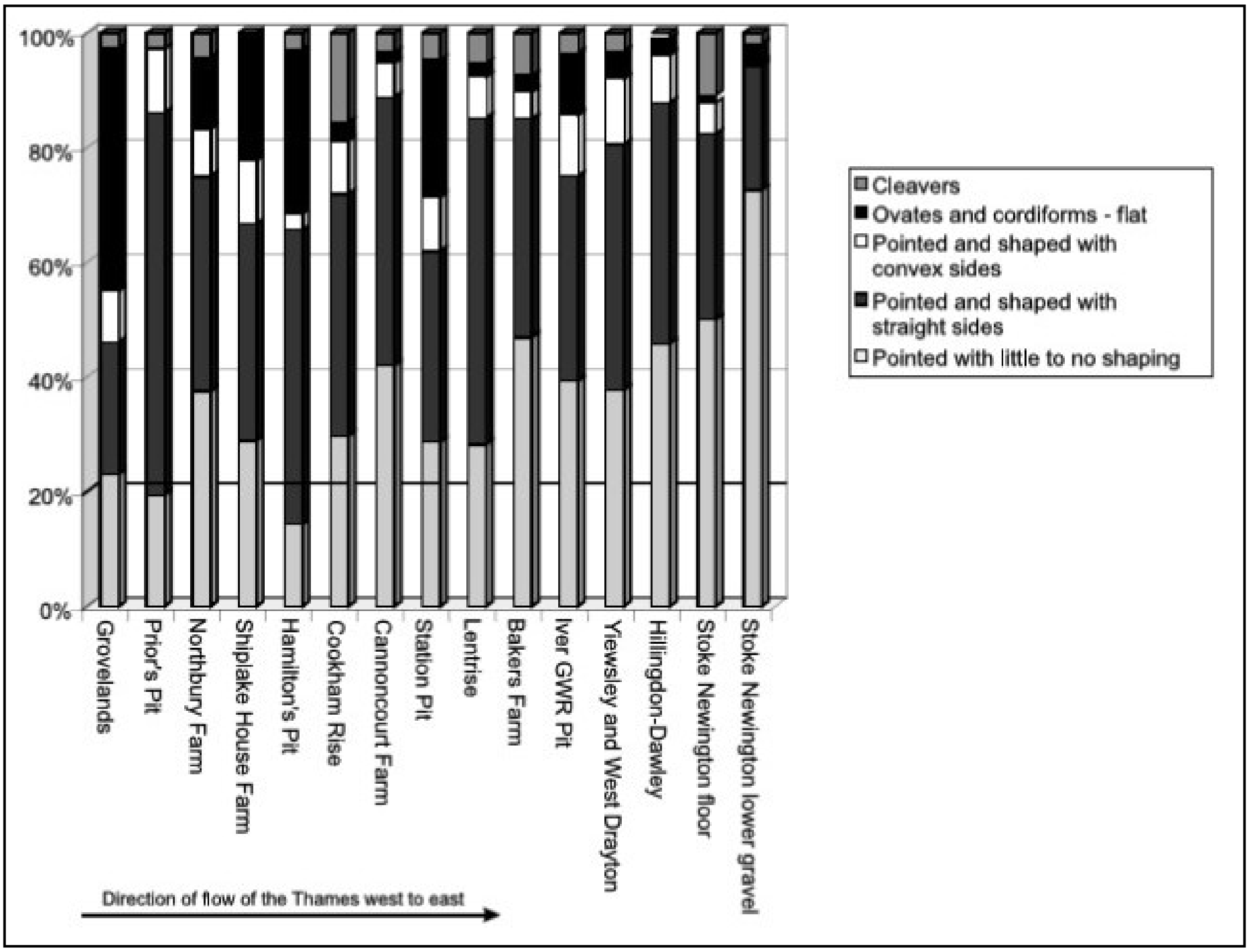


Figure 6.25. Changes in handaxe typology at selected handaxe assemblages on the Lynch Hill terrace of the Thames, from McNabb (2007), Fig. 6.3, p. 172.

In McNabb's analysis, the tendency for a concomitant increase in well-made pointed types is less apparent. Interestingly, the Lynch Hill terrace sites at Station Pit, Hamilton's Pit, Shiplake House Farm and Grovelands Pit have refined ovates and cordiforms in proportions greater than 20% of the total sample, a pronounced difference to the sites measured here and a suggestion either of mixed assemblages, or an even greater complexity and diversity in MIS 9 handaxe typology.

None of the trends suggested above (i.e., decreasing W – E size, increasing W – E numbers of type E handaxes, decreasing W – E elongation) is unequivocal but, taken together, they point to a change in preferred handaxe form between the London area and the Middle Thames, albeit one overprinted by substantial intra- and inter-site typological and morphological variation. This could conceivably represent an example of geographical patterning in handaxe morphology. However, this is difficult to explain considering that there is no geographical barrier to prevent movement between the London area and the Middle Thames; the boundary is entirely arbitrary, where previously defined cultural signatures have been confined to discrete areas or delineated by rivers (e.g., White et al., 2019; Ashton & Davis 2021). Several alternative interpretations of the observed patterning are considered below:

- Derived and mixed assemblages.

The great majority of Lower Palaeolithic material is derived insofar as it has undergone some degree of post-depositional movement (Tuffreau & Antoine 1995; Bridgland 1994; Wymer 1999; Hosfield & Chambers 2005). This movement may have been minimal, as was probably the case at Wolvercote, Broom and the Stoke Newington 'floor', resulting in assemblages which represent a relatively tightly constrained snapshot in space and time penecontemporaneous to the deposits in which they were incorporated. However, handaxes may also have been derived from earlier deposits through vertical reworking: handaxes which were produced and discarded in an earlier sub-stage of the same interglacial as the bulk of the assemblage may result in intra-period mixing (i.e., mixing of artefacts from different MI sub-stages), whereas handaxes produced and discarded in an earlier interglacial may result in inter-period mixing. It is unclear exactly how a derived artefact may be identified within an otherwise autochthonic assemblage. Condition may provide some clue in this respect; an object derived from earlier deposits may be expected to have a more complex taphonomic history, and therefore have suffered a greater degree of abrasion. This may occasionally result in a mixed assemblage from which the constituent parts can be isolated, usually where the metrical and typological characteristics of the more and less abraded condition series are clearly different. Examples of this are Dunbridge and Warren Hill, where the fresher and more abraded parts of the assemblage show distinct morphological characteristics indicative of different cultural groups (Ashton & Davis 2021; Dale et al., 2021; Davis et al. 2021a, b).

It is not always possible to separate artefacts by relative age based on condition, however. An object moved from a relatively distal location (upstream) before deposition downstream may have suffered similar degrees of abrasion to a relatively older, vertically reworked object, despite being made in approximate contemporaneity with the sediments in which it was deposited. The processes which act upon a handaxe once it has entered a river are complex and are influenced by the raw material and morphology of the object, as well as the duration and manner of fluvial transportation (Chambers 2005). Perhaps the best that can be said for condition, is that relatively fresh artefacts contained within coarse fluvial gravels cannot have moved far from the place of their original discard (Wymer 1969). Even this axiom may be challenged if larger scale downslope mass-movement is invoked (e.g., as suggested by Pettitt & White (2012) for Harnham), and experimental work on flakes showed that short to medium distance fluvial transportation can occur without any measurable abrasion (Hosfield & Chambers 2004).

Derivation from higher to lower terraces (and the admixture of relatively older with relatively younger material) is a noted feature of the Solent terraces, as described above (Ashton & Hosfield 2010). In the present study, Dunbridge (and to a lesser degree, Warsash) show some evidence of multi-period mixing, with different handaxe types occurring in different proportions according to condition. Beyond the Solent, the identification of derived artefacts within the Thames terrace sites is particularly important, as these sites form a crucial element of the identification of chronological patterning in Britain (e.g., Bridgland & White 2014, 2015; White et al., 2018). Condition alone is again a poor indicator in this respect; most of the assemblages represent secondary aggradations, where handaxes may have been moved and reworked multiple times before reaching their final point of deposition, while still relating to the MIS 9 glacial-interglacial cycle. Consequently, handaxes generally occur in a wide range of conditions, often without clear modal 'peaks' which might indicate mixing.

Two means of identifying the extent of derivation may be applied. Firstly, it may be assumed – cautiously – that certain well-attested, chronologically restricted types would not be expected in MIS 9 deposits. The twisted ovate may be most relevant in this regard, as it is typical of certain MIS 11 (Boyn Hill terrace and correlative) assemblages. These may be expected to have contributed a greater amount of derived material to MIS 9 deposits, as they represent the terrace one 'step' above the Lynch Hill terrace and its correlatives. The presence of these types might be used to roughly gauge the degree of derivation present in an assemblage, in the sense that a high proportion of twisted ovates would probably indicate a significant degree of derivation from older deposits. One such assemblage, at the Traveller's Rest Pit, Girton, Cambridgeshire, was rejected from inclusion in the present study based on the presence of twisted tips and profiles in addition to the overall broken and abraded condition of the assemblage. The Traveller's Rest Pit deposits have been suggested to be of MIS 9 age (Boreham 2002; Boreham et al., 2010). The Traveller's Rest Pit assemblage, held at the Sedgwick Museum, Cambridge, was comprised of only 17 handaxes: at least 29.14% of the assemblage (n=5) was twisted in profile, and the interpretation of the assemblage as being substantially derived was supported by the fact that 70.59% (n=12) of the assemblage was too fragmentary to allow metrical analysis, and almost all the artefacts were heavily rolled.

This 'broad-strokes' means of identifying derived material has several significant limitations, not least due to the occurrence of 'pseudo-twisted' handaxes in MIS 9 contexts (e.g., at Broom (Green & Hosfield 2013; White et al., 2019)). There is also an element of circular reasoning in *assuming* twisted ovates do not occur in MIS 9 deposits (if they are dismissed as being derived when they are found), but the results of the present study do seem to support the suggestion that the type did not occur in significant numbers in the Purfleet interglacial. It should also be noted that not all MIS 11 handaxe assemblages had large proportions of twisted ovates, which were patterned at both a sub-regional geographical and sub-stage chronological level (White et al., 2019; Ashton & Davis 2021). Nevertheless, the absence of large proportions of 'true' twisted ovates at any of the sites in this study may be taken as ancillary evidence of a *limited* derived component at most MIS 9 sites in this study.

More general evidence of the relative lack of derived objects in the Middle Thames assemblages may be found by examining the archaeological contents of the Taplow terrace. Handaxes were overwhelmingly replaced by Levallois technology in the southeast of England at the Lower – Middle Palaeolithic transition (Scott 2010; Pettitt & White 2012), and so the Taplow Terrace (MIS 8 – 6, Early Middle Palaeolithic) might be expected to have few if any Acheulean sites formed in contemporaneity with the deposits themselves. Conversely, if significant derivation of artefacts from higher to lower terraces had occurred in the Thames terraces, then derived (MIS 9 or older) archaeology might be expected to occur in the Taplow terrace gravels. Regrettably, some degree of this Lynch Hill - to - Taplow terrace derivation is evident, particularly at the site of Taplow itself where a predominantly pointed, heavily rolled handaxe assemblage was found (Wymer 1968, 1969). The Taplow assemblage consists of at least 62 handaxes (TERPS), suggesting that significant numbers of artefacts could be derived together as opposed to being attenuated throughout the younger gravel through size-sorting (Hosfield 2011a). Scott et al., (2010) also reported derived handaxes at the base of the Levallois dominated sequence at Ebbsfleet, a site correlated with the Taplow-Mucking terrace (Scott et al., 2010). These concerning examples should be balanced against the fact that the wider Taplow-Mucking terrace did not produce many handaxes (Cockburn et al., 1969; Ashton & Lewis 2002). Assuming that the same levels of derivation occurred from the Boyn Hill terrace to the Lynch Hill terrace, the *large-scale* derivation of artefacts should not be a complicating factor at the Thames sites assessed here.

Intra-period mixing (i.e., between earlier and later sub-stages *within* MIS 9) would be difficult to reliably identify unless significant metrical or typological differences were identified between earlier and later handaxes. Bridgland's terrace model suggests that the major phases of aggradation occurred at the beginning (Phase 2) and end (Phase 5) of interglacial phases, along with a minor aggradation of fine-grained material deposited during the fully interglacial phase (Phase 3) (Bridgland 1994, 2003). Artefact assemblages from within Phase 2 gravels must date to the earlier part of the interglacial, barring derivation from deposits relating to the previous interglacial cycle (which would constitute inter-period mixing). Assemblages from within Phase 5 gravels may represent an intra-period mix of handaxes from any period in the preceding interglacial, including reworked Phase 2 deposits; again, condition is generally a poor way of differentiating between relatively older and younger handaxes, although it is accepted that fresh examples are more likely to have been deposited at the same time as the gravel formed (Hosfield 2011a). It is difficult to differentiate Phase 2 gravels from Phase 5 gravels where the intervening Phase 3 deposits are absent (Bridgland 1994; Hosfield 2011a), and consequently it has previously proved difficult to correlate variations in handaxe morphology to fine-grained (sub-MIS) chronological spans where assemblages came from fluvial gravels, although this will be attempted in the following chapter.

- Raw materials

The weight of evidence currently points to a cultural control on handaxe shape preferences (e.g., Wenban-Smith 2004; Bridgland & White 2014, 2015, 2018; White 2015; Shipton & White 2020), rather than shape preference being strictly controlled by raw material (e.g., White 1998; Shaw & White 2003). However, it is axiomatic that the basic *dimensions* of a handaxe are limited by the raw material. Simply put, a large handaxe cannot be created from a small blank. The well attested correlation between handaxe length and elongation (e.g., Jones 1994; McPherron 2000), would further suggest that narrow handaxes were generally not created on small blanks. Roe (1981) suggested that there was 'no indication that the small sizes [of handaxes at Stoke Newington] were forced on the makers by the absence of large nodules of raw materials', based on his own work in the area in 1971. The small but well contextualised South Woodford assemblage supports Roe's suggestion, as three of the four handaxes were quite large and heavy despite originating from deposits close to the Stoke Newington area (White et al., 1998b). White's study of raw materials, which included both Stoke Newington and Furze Platt, may be more instructive in identifying the source of the observed variation (White 1995, 1996, 1998b). At Furze Platt, the raw material was primarily derived from the coarse fluvial gravels present at the site including flint clasts derived from higher terraces and from the underlying chalk bedrock. Access to the chalk itself was not possible, however, leading White to suggest that the site was effectively abandoned once the gravels were buried under sands and access to raw materials was stymied (White 1998b). The situation at Stoke Newington was comparable, although with key differences: there, the bedrock was London Clay, and the only source of suitable flint clasts was the flint-rich gravels of the Lea which occurred in the locality. White noted that the residual cortex on both Furze Platt and Stoke Newington implements was water-worn in most cases, but that a greater proportion of the Furze Platt handaxes had relatively fresh cortex. This suggests that the fresher Furze Platt flint clasts had been only minimally transported by the Thames, and perhaps (although not necessarily) suggests that larger clasts were available for handaxe manufacture.

Even if the average flint clast size at Stoke Newington *were* smaller on average than at Furze Platt, it does not necessarily follow that the handaxes would also be smaller. Lower Palaeolithic hominins are known to have been selective in choosing which raw materials to use, with evidence of nodule selectivity and testing at Boxgrove (Austin 1994). Wolvercote might also be highlighted as an example of a site where the local, inferior raw material was not suitable for the preferred handaxe form, resulting in the importation of material (Tyldesley 1986; MacRae 1988; Ashton 2001, 2008). Large handaxes, including extravagant ficrons, were also produced at the relatively flint impoverished Upper Thames sites of Berinsfield and Gravelly Guy (Stanton Harcourt) on what is assumed to have been manuported flint (Lee 2001). It might therefore be suggested that, even if the *average* flint clast-size in the Stoke Newington gravels were smaller than at Furze Platt, the handaxe makers could simply have selected or imported larger clasts, had larger handaxes been desired. That said, it is hard to entirely eliminate raw material as a controlling influence on the difference in average handaxe size between Stoke Newington (sub-group IB) and Furze Platt (sub-group IA).

It is also less clear whether the observed typological differences can be directly related to initial clast size: a small clast can be reduced into a small, relatively symmetrical pointed (type F) handaxe, yet the dominant type at Stoke Newington was the small, *irregular* handaxe (type E). Nor can the quality of the raw material be accepted as a likely explanation: White recorded roughly equal numbers of pre-existing material flaws in the flint from both Furze Platt and Stoke Newington (White 1998b). The Stoke Newington handaxes cannot be dismissed as quickly made, inherently disposable tools which their makers took little care in making – counterintuitively, the flake scar-density on Stoke Newington artefacts was significantly *greater* than that for Furze Platt artefacts, in both the present study and in White's (1998b) raw materials study. This points to the Stoke Newington handaxes being intensively worked with many small removals, which still resulted in generally small, crude and irregular handaxes.

- Bias in collection.

Selectivity of collection has previously been gauged by recording the per-centage of handaxes in a given collection, with higher proportions of cores and flakes taken to indicate lower selectivity (Ashton et al., 2018; Harris et al., 2019). This is because collection of artefacts was often made through 'proxy collectors' (Harris et al., 2019), mostly gravel pit workers or laborers, who would identify and retain objects for sale to antiquarian collectors (Juby 2011; Harris et al., 2019). The question of whether proxy collectors would be less adept at identifying (or less incentivised to collect) a crudely made handaxe over a finely made one is less clear. The financial reward of forging well-made handaxes, and Worthington Smith's lament that some collections were composed only of ‘highly-finished and perfect implements’, certainly suggests that well-made handaxes were selectively collected at the expense of crude examples in some cases (Smith 1879; O’Connor 2007).

The London area sites (Group IB) were mostly collected by Worthington Smith, who was considered a reliable collector (Roe 2009). Worthington Smith amassed his collection through objects he had found personally, and through objects identified by workmen he had trained to identify worked flint (Smith 1887a, 1887b, 1894, 1904, 1916; Roe 2009; Harris et al., 2019). Crucially, Smith had attempted to build a representative collection rather than a collection of large or well-made objects (Smith 1879). The high proportion of crude and small handaxes from the Stoke Newington area and neighbouring sites attest to Smith’s unselective collection. Hazzledine Warren, who amassed part of the Stoke Newington sample analysed in the present study, was considered to have followed Smith’s example in his collecting activities (Harris et al., 2019). The other Group IB sites were located on the Great Ouse: the Kempston assemblage, which again showed high numbers of small, crude types, was also collected by Smith. The reliability of Wyatt (Biddenham Pit) as a collector is harder to gauge; his own geological observations of the pit were praised for their accuracy (Wyatt 1862; O’Connor 2007) and he published his findings widely, perhaps suggesting a more methodical approach to collecting. There was, however, a market for the sale of Biddenham implements (O’Connor 2007).

The Middle Thames sites (Group IA) in this study were mostly collected by Ll. Treacher and A.D. Lacaille, both considered to be assiduous collectors (Treacher et al., 1948; Hosfield 2009; Harris et al., 2019). There was nevertheless a suspicion of ‘selective collecting’ from Furze Platt, particularly in the case of Treacher, who assembled most of his vast collection through objects purchased from the pit workers. The pit workers would retain the best implements to sell to Treacher (Cranshaw 1983), suggesting that the financial reward for ‘good’ pieces incentivised their identification and retention. On the other hand, Treacher also collected handaxes from the London area sites of Hillingdon (Dawley) and Iver (G.W.R. Pit), both of which had larger proportions of small, crude handaxes. This offers some support to his reliability as a collector of smaller, crude handaxes (Wymer 1968), although he did not routinely collect flakes before the 1920s, which is often cited as an indicator of good collecting practise (Treacher et al., 1948; Harris et al., 2019). The other major Middle Thames collector, A.D. Lacaille was a ‘catch-all’ collector who published his favoured sites widely and personally collected artefacts during the working life of the pits he visited (Lacaille 1940; Wymer 1968). As such, the potential influence of collectors’ bias on Treacher’s extensive Middle Thames collections may be tested through comparison to Lacaille’s collections from the same sites. Furze Platt may be used as a case-study example in this case, as it provides by far the largest sample collected by both collectors and has been curated across several museums.

i. *Comparing Lacaille and Treacher at Furze Platt*.

Three typological analyses of Furze Platt are available for comparison here; objects assessed by the author from the A.D. Lacaille Collection (BM, n=149) and the Ll. Treacher Collection (ROM, n=192), in addition to objects from the Ll. Treacher Collection (OUM, Reading Museum, n=580) assessed by Wymer (1968). Treacher's earlier collections, probably from the nearby Cooper's Pit, are also included in two samples, one undated (ROM, n=242) and one collected prior to 1899 (ROM, n=30). The 'reduced' typological scheme of Wymer (1985) is used to mitigate inter-analyst variation. The results are shown below in figure 6.26.

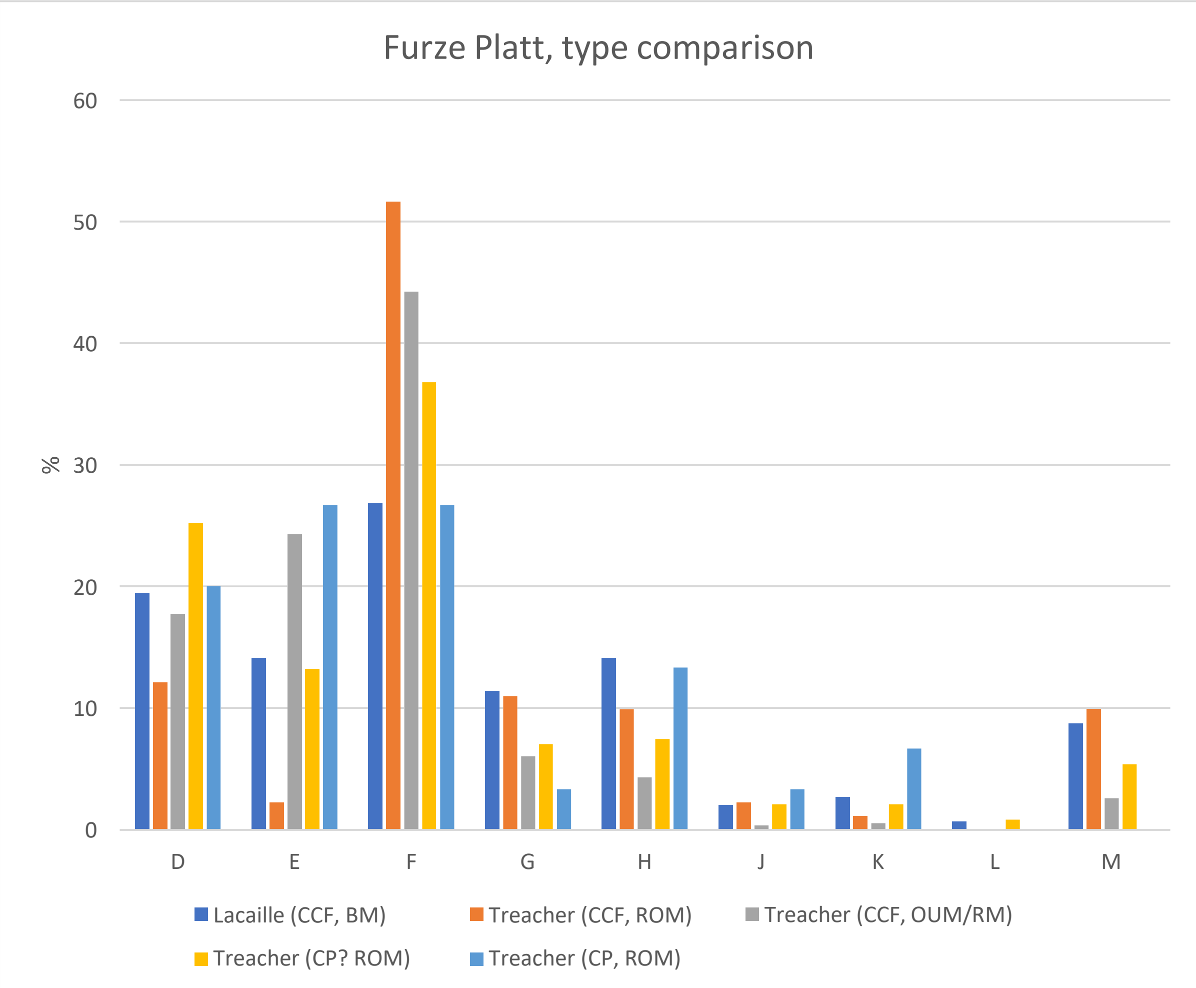


Figure 6.26. A typological comparison from Furze Platt, drawing on data derived from two analysts (L. Dale and J. Wymer) and two collectors (A.D. Lacaille and Ll. Treacher). Handaxes also originated from two pits at Furze Platt, Cannoncourt Farm Pit (CCP) and Cooper's Pit (CP). This comparison strongly suggests that neither Lacaille nor Treacher were especially selective in their collecting, lending weight to the validity of comparisons between the London area and Middle Thames.

The patterns are broadly similar across both collectors and all samples, within an expected degree of variability. Assuming Lacaille's collections were not themselves subject to significant selectivity, these results are not consistent with Treacher's Furze Platt collections being greatly distorted by collectors’ bias. In fact, Treacher’s Furze Platt (CCF, OUM/RM) collection has a greater representation of type E handaxes than Lacaille’s Furze Platt (CCF, BM) collection. The slight variability between the various Furze Platt collections may be partially explained through lateral variability in handaxe shape and type across the site. Artefacts were collected at different times throughout the working life of the pits, and lateral changes in the typology and morphology of the handaxes would therefore be reflected in the characteristics of museum collections depending on the date of collection (Dale 2020). The relative paucity of type E handaxes in Treacher’s ROM (CCF) collection may be explained through more prosaic circumstances; inferior examples (presumably mostly crude or broken handaxes) from the ROM collection were given away as teaching aides at some point between the acquisition of the collection in 1911 and the 1970s (Fox n.d.; Cranshaw 1983).

6.12. Summary.

Handaxe assemblages aligning with Roe’s Group I were found across southern Britain, although a greater variation in metrical characteristics was established than had previously been identified in the group. In the Solent, there were a small number of sites which aligned with Roe’s Group IV in a possible example of spatial patterning, although the credentials of most of those sites – which very likely represent mixed, vertically derived assemblages – can be questioned. The possibility of a particular preference for cleaver types in East Anglia is weakly suggested, although the trend is not apparent across all sites. The distribution of sites which aligned to the newly aligned sub-groups (IA and IB) appeared to be spatially controlled, with the smaller, cruder sub-group IB handaxes occurring in the London area and Great Ouse only. Spatial patterning is an unsatisfactory explanation for this variation, as there is no physical barrier to movement between the Lower and Middle Thames, and only two of the three Great Ouse sites aligned with sub-group IB. None of the other explanations explored (raw material control, collectors bias) provided a satisfactory explanation for the observed patterning in handaxes between the London area and the Middle Thames; this patterning will be examined through the lens of temporal (chronological) patterning in the following chapter.

Chapter Seven: Chronological Patterning.

7.1. Introduction.

Multiscalar geographical and chronological patterning is a key focus of this study. The enquiry into possible chronological patterning follows two threads: the first, outlined in the previous chapters and discussed more fully here, is the testing of the previously made assertion that MIS 9 handaxe assemblages show a preference for the shapes described by Roe's (1968a) Group I (e.g., Bridgland & White 2014, 2015, 2018; White et al., 2018), and the second is the possible identification of sub-MIS scale patterning within MIS 9.

It is necessary to consider whether the sites in this study (and the data collected) can be expected to reliably answer these questions. Clarke's (1973) '*Archaeology: The Loss of Innocence*' sets out a hierarchical series of factors influencing the information available to an archaeologist:

1. "The range of hominid activity patterns and social and environmental processes which once existed, over a specified time and area."
2. "The sample and traces of these (1) that were deposited at the time." (Deposition)
3. "The sample of that sample (2) which survived to be recovered." (Post-deposition/ taphonomy)
4. "The sample of that sample (3) which was recovered by excavation or collection." (Collection)

In theory, information is lost at each step down this hierarchy (Foley 1981), and so each step must be considered carefully to ensure that the questions being asked are correctly scaled to the data available (Gamble 1999; White & Schreve 2000; Ashton & Lewis 2002; Hosfield & Chambers 2004; Bynoe et al., 2021). The focus of the following section will be on deposition, that is (to paraphrase Clarke), the sample and traces of the range of hominin activity patterns represented by deposited material over a specified time and area. The section after will deal with taphonomy (i.e., condition and derivation), and the final section will consider collection bias.

The 'specified time and area' mentioned by Clarke is a crucial point. *In situ* Lower Palaeolithic archaeological sites are understandably highly valued by researchers of prehistory, and are vital in reconstructing site structure, handaxe reduction sequences through refitting elements, and the relationship between fine-grained environmental data and artefacts (amongst many other things, e.g., at Boxgrove (Bergman & Roberts 1988; Bergman et al., 1990; Pope 2002, 2004)). The potential advantages of *in situ* assemblages may not be applicable to the questions asked in this thesis, however. Binford & Binford (1966, 1969) highlighted the impact of heterogeneity of behaviour within a territory, which could result in a variable archaeological record produced by a single culture within a restricted time period. Wenban-Smith (2001) noted the specific impact that this variability could have on Lower Palaeolithic sites where pristine, undisturbed assemblages – which are often seen as the most desirable in terms on analysis – could provide a 'snapshot' of behaviour which is nonetheless not representative of all behaviours undertaken by the cultural group in question. The potential problem of over-reliance on *in situ* sites in addressing questions posed at the regional and millennial scale is illustrated by Roe's treatment of Wolvercote (Roe 1968a). Wolvercote was one of only a handful of sites in Roe's original study which even approached being *in situ* and appeared sufficiently different from his Group I sites to justify the creation of a Group III. Aside from the inherent problems of populating a 'group' with a single site (a problem Roe himself was clearly aware of), the differing scales of time involved in creating the different assemblages make it a case of 'comparing apples and oranges'; Wolvercote may have formed on the scale of days to decades, sampling the behaviour of only a small band or even an individual (Tyldesley 1986), whereas Furze Platt (and the other Group I sites, probably including the multiple levels of 'Palaeolithic Floor' and gravel at Stoke Newington) may represent hundreds to thousands of years of archaeology deposited within the Lynch Hill gravels. The specific case of the Wolvercote handaxe assemblage, and the argument against its treatment as a separate cultural entity, is outlined fully below.

figure 7.1 (after White (in prep.)) shows a schematic representation of the geographical and temporal catchment of several of the key sites in this study, along with an interpretative key. Sites which fall within the smaller box ('primary') approach *in situ* credentials and may be too restricted in time to provide a representative sample of technological behaviours over the millennial (MIS) scale, although such sites may be somewhat valuable for sub-MIS scale analysis where they are robustly dated. Sites within the largest box ('aggregate') are accumulations of millennia, resulting in a homogenised multi-period mixture which masks chronological or regional patterning entirely, and are of limited use at any scale. Those sites within the middle box ('secondary') offer the best balance of representing a full range of shape preferences and technological behaviours without dissolving patterns into time-averaged homogeneity. These sites may be used to reconstruct millennial (MIS) scale patterning, although they may also be useful for sub-MIS scale patterning if restricted ages (hundreds-to-thousands of years) can be suggested (discussed fully below). Key sites from the present study are shown on the schematic chart are shown in figure 7.2.

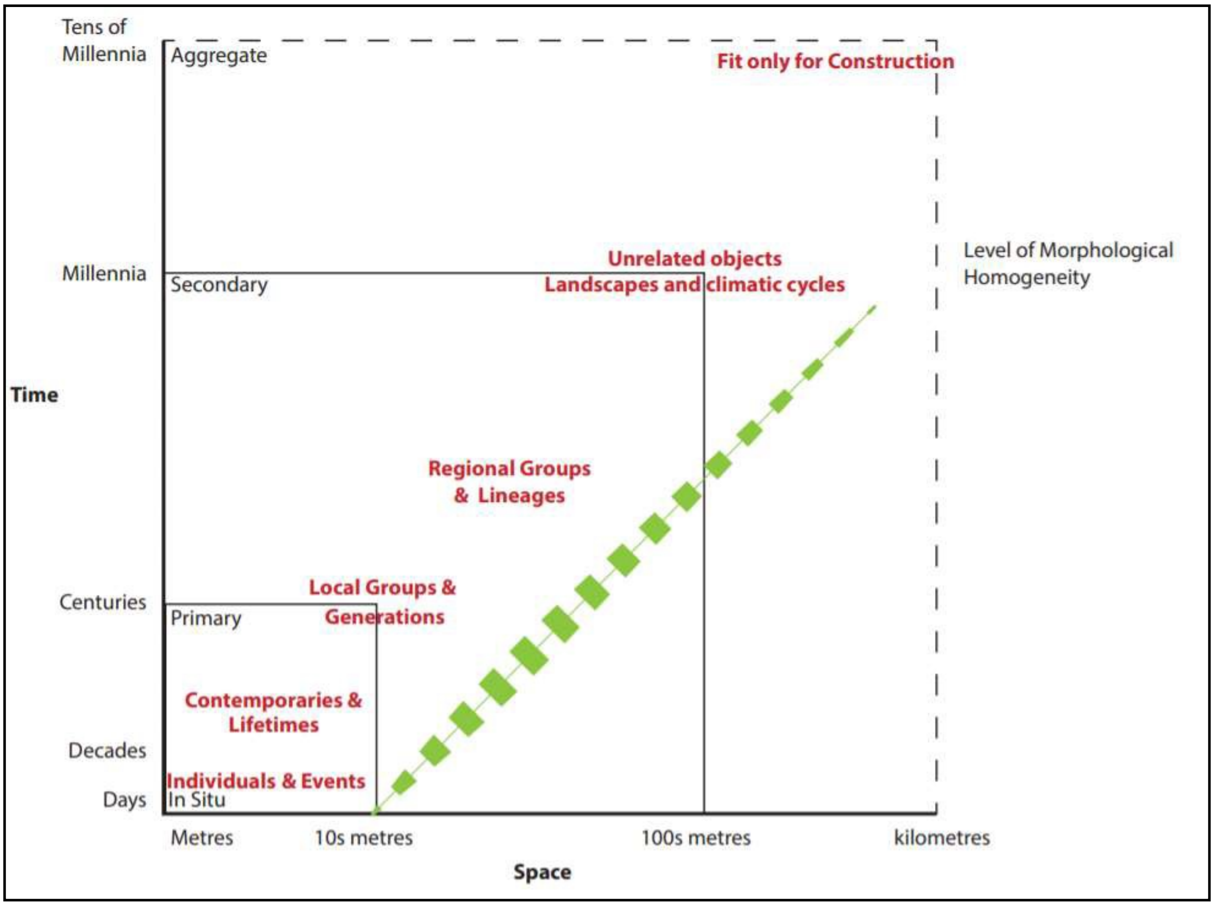


Figure 7.1. A schematic showing the usefulness of different archaeological contexts, indicated by the nested series of squares from 'in situ' at the origin to 'aggregate' at the outer edge, in terms of answering questions of geographical and chronological patterning (shown in red). Figure from White (in prep.).

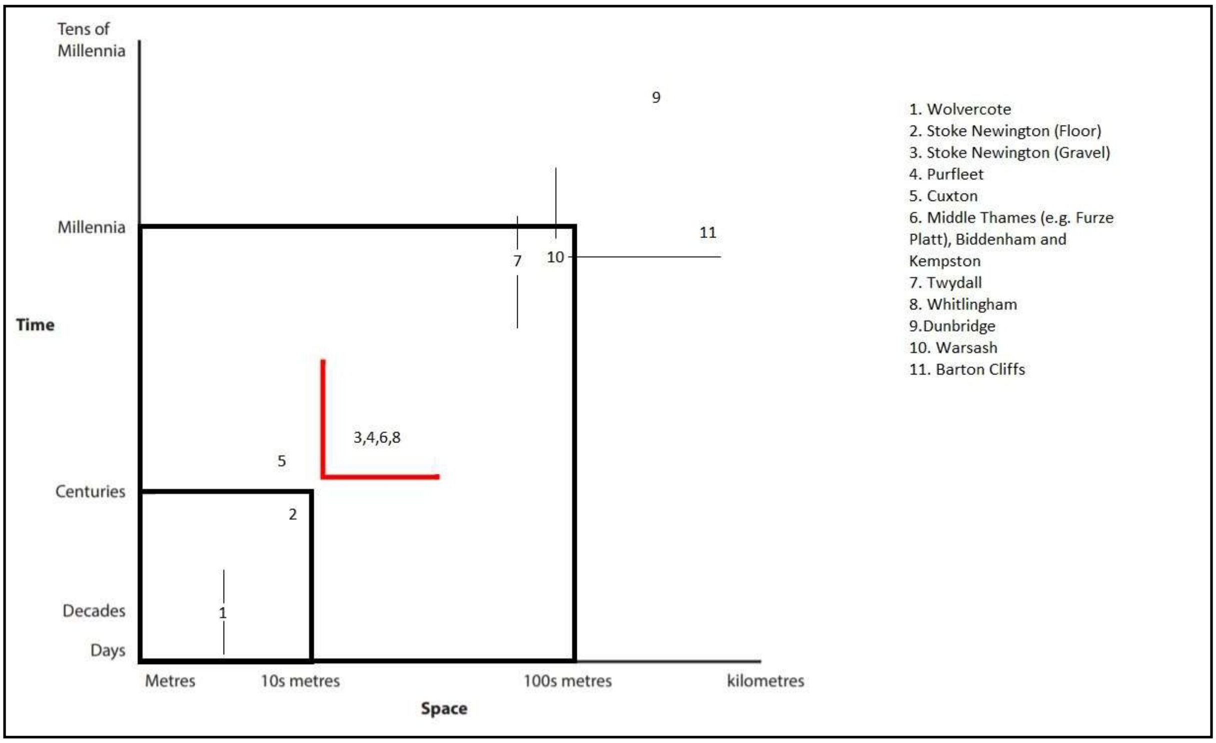


Figure 7.2. Key sites from the present study mapped onto White's schematic chrono-spatial scale (White in prep.).

Lower and Middle Palaeolithic archaeological assemblages across Europe overwhelmingly occur in fluvial secondary contexts (Bridgland 1994; Wymer 1999; Hosfield & Chambers 2005), a pattern reflected in the sites selected for the present study. However, a reliance on secondary assemblages is no impediment to answering the question of overarching patterns in MIS 9 handaxe morphology and typology and may in fact provide a more representative view of MIS 9 handaxe technology than *in situ* assemblages.

7.2. Possible sub-stage chronological patterning in MIS 9.

White et al., (2019) and Ashton & Davis (2021) developed the idea of spatial lithic variation at a sub-regional level, the latter proposing a 'Cultural Mosaic Model'. Ashton & Davis argued that the varied lithic assemblages observed in the archaeological record (MIS 15 – 11) reflected different hominin groups colonising Britain from different parts of Europe: the complexity of the British record is therefore viewed as an extension of complex variation in Europe, although the unique cycle of colonisation, extirpation and recolonisation in response to climatic fluctuations make these changes more visible in the British record (White and Schreve 2000; Ashton and Lewis 2002; Dennell et al. 2011; Pettit & White 2012). Ashton and Davis identified six 'repopulation events' where new handaxe-making groups arrived from Europe, leaving a distinct lithic signature; three of these recolonisations probably occurred in MIS 15 and MIS 13, and three more in MIS 11 (shown in table

7.1 , supporting the findings outlined in White et al. 2019). They used a combination of stratigraphic, taphonomic and morphological analysis to discriminate between pre-Anglian (MIS 15 – 13) handaxe assemblages, mostly preserved in the relict gravels of the former Bytham river in East Anglia; sub-MIS level analysis of MIS 11 sites was again permitted by the presence of 'long' sedimentary records, containing pollen and faunal remains alongside archaeology, at several key sites as discussed above. They suggested that distinctive handaxe forms, combined with archaeologically invisible factors (e.g., organic tools, language) would have provided a measure of social cohesion, thus permitting the maintenance of larger territories in northern latitudes such as Britain.

Table 7.1. Regional and chronological variation in preferred handaxe form in Britain (MIS 11), from Ashton & Davis (2021).

Assemblage Type (Ashton & Davis 2021)	**Roe (1968) group.**	**General Characteristics**	**Sites**	**Possible additional sites**	**Suggested Age**
5a	VI (Elveden), II (Foxhall Road, Hitchin)	Predominantly ovate handaxes, many with twisted edge profiles	Elveden Barnham (Palaeosol)	Beeches Pit Foxhall Road Hitchin	MIS 11c
5b	II?	Predominantly pointed handaxes, often small with thick, cortical butts	Swanscombe (Lower Middle Gravel) Swanscombe (Upper Middle Gravel)	Chadwell St Mary East Burnham	MIS 11c
6	VI	Twisted ovate handaxes	Swanscombe (Upper Loam) Greenhithe (Stoney Loam) Dartford (Wansunt Loam)	Hoxne	MIS 11a

The studies summarised above provide a precedent for sub-MIS chronological patterning in earlier interglacials. Sub-MIS patterning has also been identified within MIS 9, based on the tripartite succession of technocomplexes identified at Purfleet. The Clactonian is associated with the earliest part of the interglacial (MIS 10/9 – MIS 9e) (Bridgland et al., 2013; Rawlinson 2021), whilst proto-Levallois has been assigned to MIS 9b, or more generally to the MIS 9/8 transition (Westaway et al., 2006; Bridgland et al., 2013; Bridgland & White 2014). The Acheulean in MIS 9 has generally been placed between these two temporal anchors, although a late survival has been suggested (discussed fully below; Bates et al., 2014), and the evidence from Europe certainly suggests that handaxes continued alongside Levallois technology, albeit in diminishing numerical importance, throughout the Lower- Middle Palaeolithic transition (e.g., Santonja & Villa 2006; Moncel et al., 2011, 2012, 2020b). In terms of the sub-MIS patterning of handaxe morphologies, no concrete suggestions have been made, although White & Bridgland (2017) tentatively suggested that Wolvercote was a later rather than earlier occurrence. In terms of the MIS 9 Acheulean in Britain, one of the most pressing problems is the chronological positioning of the Bluelands Gravel and Botany Gravel at Purfleet (White & Bridgland 2018). If a compressed chronology is accepted, then the Purfleet Acheulean (and potentially most of the other Acheulean sites in MIS 9 Britain) may relate to the cooling MIS 9e/9d transition; if an extended chronology is accepted, the Acheulean may relate to any part of the post-MIS 9e interglacial phase (i.e., MIS 9d – 9a). Their summary of the technological patterning in MIS 9 is shown below in figure 7.3.

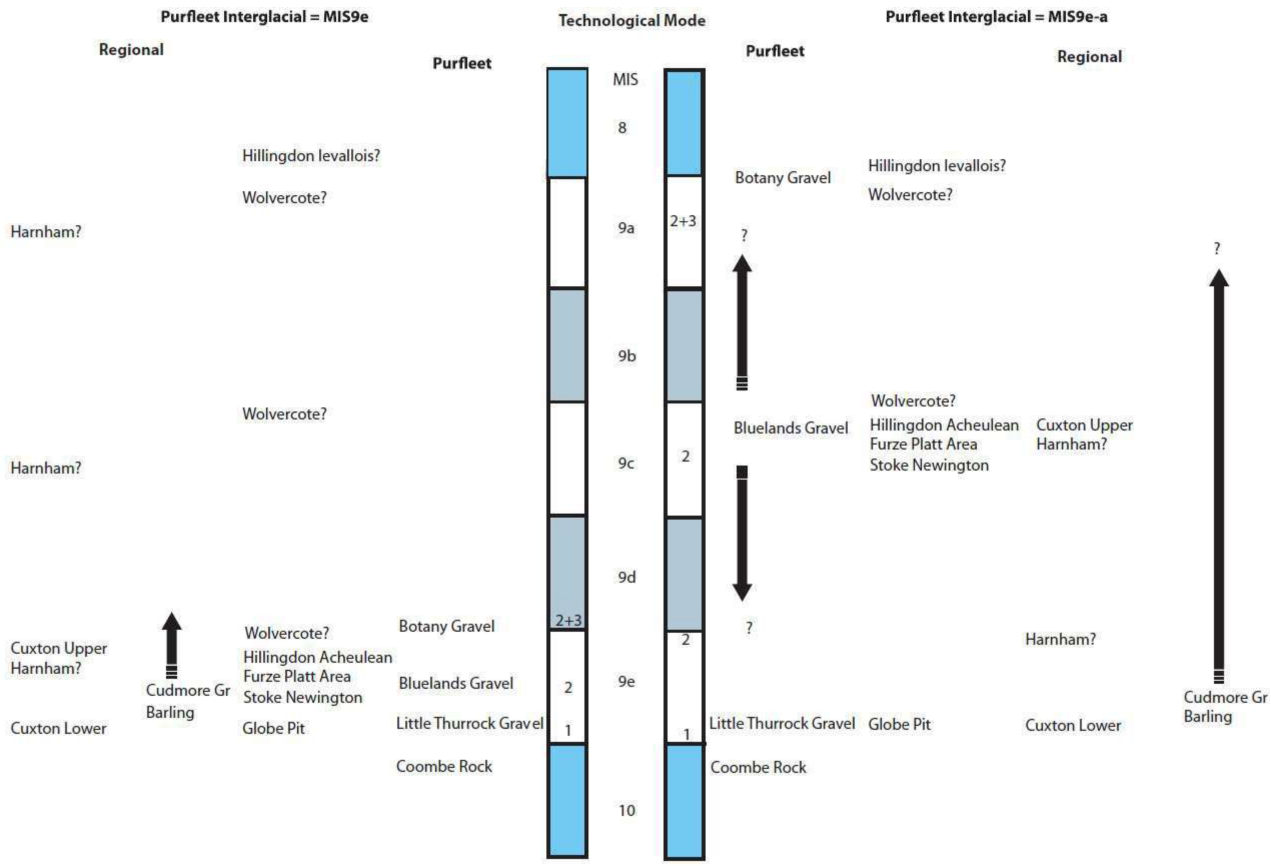


Figure 7.3. Possible settlement histories for MIS 9, accommodating for both a compressed chronology where the interglacial represents MIS 9e only (left), or an extended chronology where the whole of MIS 9 is represented (right). From White & Bridgland (2018), fig. 6.

Purfleet does not fit easily into the five-stage terrace formation model, because it has three significant gravel units (the basal Little Thurrock Gravel, middle Bluelands Gravel and upper Botany Gravel), whilst the terrace model only accommodates *two* major phases of gravel aggradation. If the Little Thurrock represents a phase 2 gravel and the Botany Gravel phase 5, it leaves the Bluelands Gravel as something of a loose end. The Bluelands Gravel may represent a decalcified version of the Shelly Gravel (Bed 3), in which case the Bluelands Gravel may be part of the Phase 3 (interglacial) deposits (as are Beds 3 – 7) (Bridgland et al., 2013). Alternatively, it may be part of the overlying Botany Gravel – indeed, it is hard to differentiate the Botany and Bluelands Gravels in the absence of Bed 7, where they are referred to together as Bed 6/8 (Bridgland et al., 2013). Equally, multiple sub-stages could be represented, as at Swanscombe – these questions remain unresolved.

If the longer chronology is followed, then sub-MIS chronological patterning may be suggested as an explanation for the metrical and typological differences between the putative sub-Groups IA and IB, an interpretation which draws on Bridgland's six-phase terrace model (Bridgland 1994, 2003, 2006) combined with the archaeological evidence from three relatively well-dated 'flagship' sites (Cuxton, Stoke Newington and Purfleet) (Bridgland & White 2018). The justification for proposing sub-MIS chronological patterning is outlined below.

1. The gravel formed by the Thames in Phase 2 of Bridgland's model (MIS 10/9, the ameliorating climatic limb of the glacial – interglacial cycle) is represented at Purfleet as the Little Thurrock Gravel, where it contains Clactonian artefacts. The Purfleet handaxes occur in interglacial or post-interglacial deposits immediately overlying the Phase 2 gravel, presumed to relate to MIS 9e (Schreve et al., 2002; Bridgland et al., 2013).

2. Similarly, the Stoke Newington 'floor' and much of its handaxe assemblage probably dates to around MIS 9e based on evidence from the nearby Nightingale Estate, Hackney (Green et al., 2004, 2006; McNabb 2007).

3. The gravels underlying the Stoke Newington 'floor' must therefore have formed prior to MIS 9e, again in Phase 2 of Bridgland's model. Handaxes contained within the lower gravel must either pre-date the gravel itself or have been deposited penecontemporaneously during its formation. Even the more rolled Stoke Newington handaxes seem to align with sub-group IB, suggesting that the artefacts were probably not derived from earlier deposits (although the broad metrical similarities between the sub-Group IB and Roe's Group II make this less certain (see discussion below)).

4. When considered alongside the evidence from the small Purfleet handaxe assemblage, and incorporating similar sites near Stoke Newington (e.g., Lower Clapton) it may be suggested that the 'early' handaxes found within the Thames Phase 2 gravels (and perhaps the Phase 3 interglacial deposits) conformed to the Group IB preference for small, relatively broad, crude handaxes.

5. At most of the prolific Middle Thames sites (Furze Platt, Baker's Farm, Ruscombe etc.), it is not known whether the early (Phase 2) or late (Phase 5) gravel is represented, as the intervening interglacial sediments (Phase 3) are missing (Bridgland 1994; Hosfield 2011a). However, it has been tentatively suggested that the Phase 5 gravel (MIS 9/8 transition) may form the bulk of the Lynch Hill terrace (e.g., Bridgland et al., 2001; Lewis et al., 2002; Wenban-Smith 2004; McNabb 2007). These sites show a preference for narrower, larger handaxes in line with Group IA. The fact that handaxes were often found at the base of the fluvial deposits – sometimes even pressed into the underlying clay – cannot necessarily be taken to indicate a Phase 2 gravel, as the artefacts could have been produced and deposited following the erosion of the earlier (Phase 2 and 3) deposits but prior to the deposition of the Phase 5 gravels (Bridgland 1994; Hosfield 2011a).

6. The occurrence of Levallois technology, found stratigraphically above but within the same fluvial gravels as the handaxes at Furze Platt, Baker's Farm and Lent Rise (Lacaille 1940; Cranshaw 1983), lends some weight to the attribution of the Middle Thames Lynch Hill gravels to Phase 5 given that variants of Levallois technology are generally thought to have occurred towards the end of the interglacial (Bridgland 1994; Westaway et al., 2006).

7. Cuxton, a site widely considered to relate *at least* to the later part of the interglacial if not the following MIS 8 glacial period (e.g., Wenban-Smith et al. 2007; Bates et al. 2014) is a clear match with Group IA despite a relatively large proportion of small, crude handaxes which were probably the result of the irregular raw materials available (Shaw & White 2003). The Cuxton assemblage may provide key evidence in support of a genuine distinction between Group IA and Group IB, as the site was meticulously excavated and was therefore not subject to collection bias; the monomodally fresh condition of the archaeology from Cuxton might suggest that the artefacts were produced relatively close together in time (although not strictly *in situ*), rather than representing a multiple MI sub-stage aggregation.

8. Wolvercote also shows a strong preference for narrow, large and well-made pointed handaxes and may also date to the later part of the interglacial, although the Wolvercote Channel is not robustly dated and the unusual metrical and technological characteristics of the site make it less suitable for comparison.

The argument for sub-stage chronological variation in the Thames is predicated on the three relatively reliably dated sites of Purfleet, Stoke Newington and Cuxton, generally supported by nearby but less well studied sites in the London area and by the well-studied but insecurely dated Middle Thames sites such as Furze Platt and Baker's Farm. Beyond the Thames and its tributaries, even coarse-grained age attributions become insecure. Biddenham and Kempston have Group IB metrical affinities although they are typologically closer to Group IA sites than Stoke Newington. Assuming the model outlined above is correct, we might expect those sites to be either interglacial (i.e., MIS 9e) or pre-interglacial in age. The handaxes at Biddenham were found 'in clay bands beneath the main gravel sequence' in association with an interglacial molluscan fauna (Boreham et al. 2010), strongly suggesting an earlier rather than later age. Descriptions of the geological context at Kempston are brief, however Wyatt (1862) described at least one flint implement which had originated from sands hosting a diverse molluscan fauna. Wyatt suggested an estuarine influence at the nearby Harrowden Pit based on the molluscan fauna, which may support an MIS 9e age attribution as sea levels were highest in the earlier part of the Purfleet interglacial (Wyatt 1862; Evans 1872; Roe et al., 2009, 2011; Bridgland et al., 2013), however it is by no means clear that the poorly described Harrowden Pit deposits are contemporaneous with either Biddenham or Kempston (Young 1984). The presence of Levallois technology at both Biddenham and Kempston might suggest a later MIS 9 age, however the Levallois material may relate to upper gravels overlying the Acheulean layer; Wyatt reported that flint flakes were found in the upper gravels, although regrettably none of the objects have stratigraphic provenances which limits the usefulness of both sites in making fine-grained chronological attributions (Wymer 1999).

There is some suggestion of a change in the character of the Lynch Hill terrace roughly consistent with the suggested change in archaeology. Wymer (1968) recorded the Lynch Hill terrace at Eton and Slough at 38.1 – 39.6m OD. Only 8km to the east are the gravels and brickearths at Iver which have a surface at 27.4m – 36.6m OD, which King & Oakley (1936) considered to be a distinct aggradation (their 'Iver stage'), although Wymer considered these to be a continuation of the Lynch Hill terrace (a view supported by Bridgland (1994)). Gravels and brickearths at the same level as Iver spread downstream into London (Yiewsley, West Drayton, Acton etc.) where there was 'no appreciable change of slope between [the] deposits and the flat expanse of the Taplow Terrace' (Wymer 1968, 245). This is in marked contrast to the prolific Middle Thames deposits of the Maidenhead area, where the Lynch Hill and Taplow terraces are divided by a sharp bluff. Wymer suggested that the difference can be explained by tidal influences: he postulated that the river was tidally influenced as far upstream as Yiewsley 'when the river flowed at the altitude represented by the surface of the Lynch Hill Terrace'. Wymer suggested that repeated marine transgression and regression during the formation of the terrace had resulted in greater geological complexity in the 'transitional' region between the Middle and Lower Thames, which was reflected in the archaeological record; most notably, in the occurrence of rich 'Levalloisian' sites at Iver, West Drayton and Ealing, and in the occurrence of handaxes at the level of the Taplow terrace (although as noted above, these may in fact relate to the Lynch Hill terrace which was less defined by break-in-slope in the Lower Thames). This is supported to some degree by Lewis et al., (2004), who identified differences in the sediment storage and transportation in different reaches of the Thames within terrace deposits from the two most recent interglacials; significantly, they identified the influence of a 'coastal prism' of sediment in the lower reaches, which formed in response to the reduced gradient of the Thames at times of high-stand sea level. However, given that the estuarine signature from Purfleet was only weak at what is thought to have been the peak sea-level in MIS 9 (Bridgland et al., 2013), it is difficult to imagine a significant tidal influence affecting the formation of the Lynch Hill terrace some 50 – 60km to the west in Hillingdon. Even if Wymer's suggestion of tidal influence is not correct, it may be significant that he identified changes in the Lynch Hill terrace which roughly correspond to the division between sub-group IA and IB in the Thames.

7.3. A Post-Anglian continuity?

Roe's Group II shares a number of similarities with Group I, including being dominated by metrically pointed types, and having similar average morphometric and technological characteristics (Roe 1968a; White 1998b). Group II handaxes can be generally characterised as being small with thick corticated butts (Roe 1968a; 1981). Group II assemblages sometimes include finely made ficrons along with lopsided handaxes and oblique backing such as the examples shown below in figure 7.4**,** all types also associated with MIS 9 assemblages (as outlined below). The Group II metrical and typological characteristics are particularly reminiscent of the Group IB (Stoke Newington type) assemblages presented here. There are of course differences between Groups IB and II which allows their differentiation; Group II assemblages were partially formed of relatively refined ovates and generally lacked cleavers (resulting in a 'sharper' average tip shape index), although Roe (1968a) speculated that the broad Group II ovates may have fulfilled a similar role to the cleavers he had identified at Furze Platt.

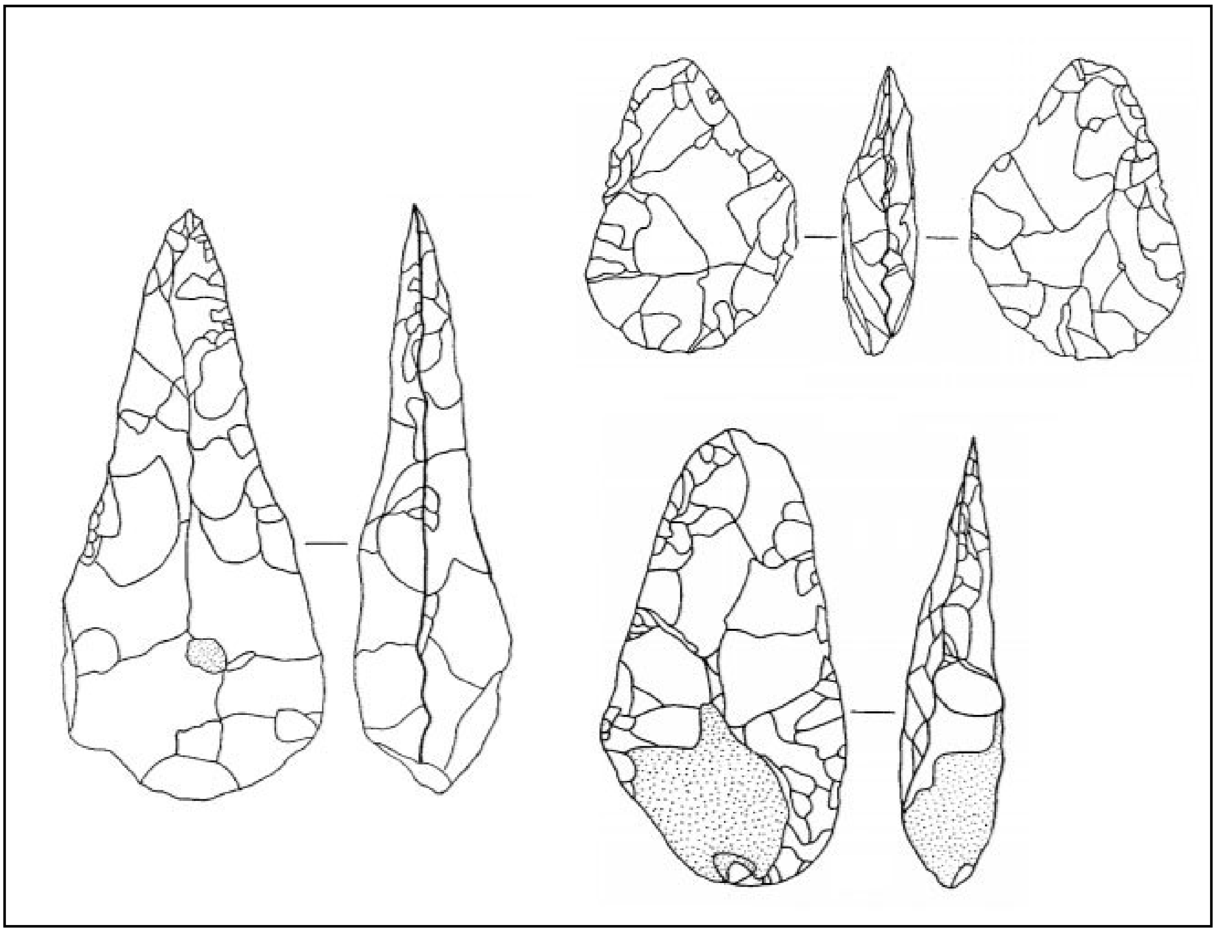


Figure 7.4. Three handaxes from Hoxne (UI), Suffolk, a site included in Roe's Group II by White (2015). The presence of large ficrons (left), macroscopically asymmetrical handaxes (top right) and handaxes with oblique cortical grips (lower right) are all reminiscent of handaxes encountered by the author from various MIS 9 sites, supporting previous observations (e.g., by McNabb 2007) that Lynch Hill terrace (Group I) and Boyn Hill terrace (Group II) handaxe assemblages are more alike than different. Figure after West & McBurney (1955) Fig. 3, p.138: 1/3 scale.

At the coarsest level of comparison, it may be noted that Roe's 'pointed tradition' sites are all post-Anglian in age (Roe 1968a; Bridgland & White 2014, 2015; White et al., 2018; Hoggard et al., 2019). McNabb (2007) noted a 'marked similarity' between handaxe assemblage typology in Lynch Hill Terrace (MIS 10 - 8) and Boyn Hill Terrace (MIS 12 - 10) sites, in contrast to the markedly different typology of Black Park Terrace (MIS 12, containing derived MIS 13 archaeology) handaxe assemblages. Early attempts to correlate Thames fluvial sites using handaxe typology also occasionally conflated Lynch Hill and Boyn Hill terrace assemblages due to their similar appearance; a notable example of this was Warren's attempt to group Furze Platt and the (Group II) Swanscombe Middle Gravel assemblage in his 'Grays Inn Lane Group' (Warren 1933). Lacaille (1940) likewise equated both the Swanscombe Middle Gravels and Middle Thames Lynch Hill sites (Lent Rise, Baker's Farm and Furze Platt) with Breuil's 'St. Acheul III' (Breuil 1932a). Building on these observations, the possibility of a weak cultural continuity between Roe's Group II and Group I, and thus between MIS 11 and MIS 9, may be suggested. The MIS 10 interglacial cycle was a 'weak' and relatively short glacial phase (c. 37ka.), with less extensive glaciation than the preceding MIS 12 (Anglian) glaciation (c. 54 ka.) (Kukla 1995, 2005; Lisiecki & Raymo 2005). Although there is no evidence of a hominin presence in Britain through the MIS 10 glacial, it is possible that populations could have survived in relatively proximal regions of Europe. These may have been the same populations which retreated from Britain as climatic conditions deteriorated at the end of MIS 11, although Hublin & Roebroeks (2009) considered extirpation and recolonisation more likely than population 'ebb and flow'; it is therefore perhaps more likely that the MIS 9 and MIS 11 populations may have originated from the same deme, or geographically isolated interbreeding subspecies (Howell 1996, 1999), somewhere in the proximal part of north-western Europe. In contrast, the extensive MIS 12 glaciation drove hominin populations back to more distal, permanent source populations in southern and south-eastern Europe (Dennell et al., 2011; MacDonald et al., 2012), perhaps resulting in recolonisation by radically different cultural groups, thereby explaining the break in handaxe planform tradition between MIS 13 and MIS 11.

On the other side of MIS 9, evidence may be sought of continuity into MIS 8 and MIS 7. Handaxes do not form a large part of the archaeological record of MIS 7 in Britain, owing to their effective replacement by Levallois technology at the Lower – Middle Palaeolithic transition (e.g., Scott 2010). Nevertheless, there are a small number of British Acheulean sites which may post-date the MIS 9 interglacial. Late Acheulean occupation in Britain has been suggested at Broom (late MIS 9 – MIS 8) (Green & Hosfield 2013), Harnham (MIS 8) (Bates et al., 2014), Milford Hill (MIS 8) (Egberts et al., 2020) and Cuxton (MIS 8 – early MIS 7) (Bridgland 2003; Wenban-Smith et al., 2007; Bates et al., 2014). Berinsfield and Gravelly Guy (Stanton Harcourt) occur in deposits dated to MIS 7 (Lee 2001), and the Great Pan Farm (Shide) deposits are also tentatively dated to MIS 7 (Bates et al., 2000; White & Jacobi 2002; Hosfield et al., 2009). Pontnewydd Cave, dated by U-Series to 230 ka (MIS 7b), may represent an exceptionally late and remote occupation of Britain in this period (Green 1984; Aldhouse Green et al., 2012; Ashton et al., 2015). It should be noted that, aside from Pontnewydd Cave and Cuxton, few of these dates are especially robust; Pettitt & White (2012) challenged the dates from Harnham on the grounds that the deposits may have moved downslope *en masse*, although recent OSL dates from Milford Hill may offer support to both Milford Hill and Harnham dating to MIS 8 supported by altitudinal correlation between the two sites (Egberts 2016; Egberts et al., 2020). The possibility that the Milford Hill artefacts are vertically derived might point to similarly aged *deposits*, but not necessarily to closely contemporaneous artefact assemblages. Great Pan Farm may well be a mixed assemblage to some degree, indicated by the occurrence of *bout coupé* handaxes (White & Jacobi 2002). The Upper Thames sites at Berinsfield and Gravelly Guy (Stanton Harcourt) may be confidently placed in MIS 7 in geological terms based on the biostratigraphic correlation of the Summertown-Radley terrace with the Middle Thames Taplow terrace (Bridgland 1994; Lee 2001), however the archaeology from both sites is poorly contextualised and often abraded, and reworking from earlier deposits has been suggested (MacRae 1982; Tyldesley 1986; Lee 2001).

Nevertheless, it is reasonable to suggest that the sites mentioned above *could* represent a late survival of the Acheulean in Britain, an idea advocated most strongly by Wenban-Smith in Bates et al., (2014). Of the potential late sites, Cuxton, Milford Hill, Berinsfield and Gravelly Guy (Stanton Harcourt) aligned closely with Roe's Group I. The small handaxe assemblage from Pontnewyyd Cave was also assigned to Group I by Emery (2010), and descriptions of the Harnham assemblage suggest that it may also have Group I metrical and typological preferences. Great Pan Farm was originally assigned to Group VI (Roe 1968a) but was re-evaluated as a Group IV site by Emery (2010) based on a larger sample; Broom appears to align most closely with Group IV also (based on analysis of data in Green & Hosfield 2013), although in many ways it forms a 'group' of its own which occupies a distinct region of morphometric preferences, coupled with a superabundance of 'lopsided' macroscopically asymmetrical handaxes. Given the evident preference for Group I forms at most MIS 9 sites and potentially for Group IV forms in the western Solent, the morphometric preferences of the putative MIS 8 – 7 sites appear to be closely like MIS 9 sites.

The other striking feature of the suggested late-surviving sites is their geographical distribution, with a pronounced western distribution ranging from north Wales to the Solent – only Cuxton is situated in the east of Britain. The apparent differences in technology between east and west Britain in MIS 8 – 7 were discussed by Ashton et al. (2015, 2018), who noted that Early Middle Palaeolithic Levallois sites were strongly concentrated in the lower reaches of rivers in eastern England and far less prevalent in the west. They interpreted this distribution as evidence of an influx of Levallois-producing hominins from an eastern source, crossing the southern North Sea during a marine low stand prior to the peak-interglacial substage of MIS 7. The occupation of Britain during MIS 7 may have been short, however, as there is little evidence of hominins in the later parts of the interglacial, and the clustering of sites in the east might suggest that populations never arrived in sufficient numbers to colonise Britain after being cut off from the European mainland.

An influx of a distinct, western handaxe producing population in the same period was used to explain the apparent late survival of handaxes at Harnham and Broom, although the Channel River would have presented a significant barrier to movement (Ashton et al., 2015, 2018). The idea of different source populations is supported by the evidence from proximal parts of Europe, with a greater number of Levallois sites in north-eastern France and the Low Countries, and more handaxe sites in north-western France (Ashton & Hosfield 2010; Ashton et al. 2011; Scott & Ashton 2011).

Unfortunately, the inadequate or contested dating of many of the supposed MIS 8 – 7 sites makes establishing clear patterns difficult, particularly as many of the sites are located on Solent terraces which may be especially susceptible to vertical derivation (Ashton & Hosfield 2010; Davis 2013; Ashton et al., 2015; Davis et al., 2021b). It can be said with greater confidence that handaxes were not made in the southeast of England in significant numbers after MIS 9, evidenced by the paucity of non-derived handaxes in the Taplow terrace (MIS 8 – 6) (Wymer 1968; Ashton et al., 2011; see above). Improvements in terrace correlation and absolute dating methods may elucidate this issue. If the late surviving western handaxe signature is indeed genuine, it may represent a colonising group from Europe, as suggested by Ashton et al., (2015). However, this would not explain the apparent continuity of metrical and typological preferences from the preceding (MIS 9) interglacial. This is significant; in each previous interglacial where Acheulean hominins have been present, the colonising groups brought new shape preferences with them (identified as Roe's Groups), even accounting for the aforementioned similarities between Groups I and II. An example of continuity between *substages* is provided by White et al., (2019), who discussed the relocation of a twisted ovate-making culture from East Anglia in MIS 11c to south of the in Thames MIS 11a. This may be taken to indicate either that the twisted ovate culture had not retreated far into continental Europe during MIS 11b, or that the source population for both MIS 11c and MIS 11a colonisations was located close to Britain, or even that the twisted ovate culture survived in southern Britain through the cool MIS 11b stadial (White et al., 2019).

These same arguments may also be suggested for the continuity of forms from MIS 9 into MIS 8 – 7; the source population may have been the same in each case, or the population may have migrated south into a proximal part of Europe, to return in MIS 7 in the west of England. Alternatively, the apparent continuity in handaxe shape preferences (Group I and Group IV) into MIS 8 – 7 might suggest a continuous population resident in Britain through the MIS 8 glacial, or shorter-lived occupations in warmer MIS 8 sub-stages (perhaps even seasonal visits) (MacDonald et al., 2012; Davis et al., 2021b). Whether hominin populations could survive periglacial conditions in the long term is questionable; Leroy et al., (2010) suggested that Early Pleistocene hominins could not survive sustained minimum temperatures below 0 – 6^{o}C, making survival through peak glacial conditions unlikely. A lobe of the MIS 8 glaciation reached as far south as Lincolnshire (White et al., 2017), however the British southwest Peninsula probably remained ice-free (Gibbard & Clark 2011), and MIS 8 has been described as a 'weak' glacial cycle along with MIS 10 (Kukla 1995, 2005; Lisiecki &

Raymo 2005). That said, reconstruction of comparable MIS 6 environments in Europe point to southern Britain being a ‘tundra and cold steppe mosaic’ at peak glacial conditions (Van Andel & Tzedakis 1996); whilst this cannot be directly mapped onto the shorter and presumably less severe MIS 8 glaciation, it would still seem likely to be a hostile environment in which a genetically viable population could survive. The impact of thermal technologies, including clothing and fire, is unclear. The first convincing evidence of fire use in Britain occurred in the MIS 11 interglacial and could therefore have provided some measure of protection against the cold (Gowlett 2006; Roebroeks & Villa 2011); indirect evidence of hide working, in the form of scrapers, can be placed even earlier in MIS 13 (Moncel et al., 2015), although the lack of direct evidence makes this speculative (Ashton 2017; Hosfield & Cole 2018). Bearing these possible technological mitigations in mind, and if the proposed cold-climate attribution for Harnham is accepted, survival in a southwestern refugium can be considered as a possibility, if a remote one.

7.4. Chronologically restricted types in MIS 9.

The preceding chapter presented morphometric and typological evidence which showed that the expected patterns in handaxes – an affinity for Roe’s Group I, and the co-occurrence of ficrons and cleavers – were upheld across most sites in most regions of southern Britain. Two subtly distinct sub-groups have been identified (IA and IB), mostly characterised by variation in the elongation index and the occurrence of smaller, crude handaxes. Nevertheless, a degree of commonality is evident; those sites which are substantially different tend to be at the geographic margins of the Acheulean world in MIS 9 and based on short term ‘snapshots’ rather than aggregations (e.g., Broom, Wolvercote). Certain key features of the MIS 9 assemblages studied which appear in almost all of the studied assemblages (cleavers, ficrons, and giant handaxes) will be examined in finer detail here.

7.4.1. Cleavers.

The presence of small but measurable proportions of metrical cleavers was a defining feature of Roe’s Group I (Roe 1968a, 1981). Many morphological and technological schemes for identifying and describing cleavers have been proposed (e.g., Tixier 1956; Kleindienst 1962; Kleindienst & Keller 1976; Cranshaw 1983), although the two simplest and most inclusive schemes were used here (Roe 1968a; Wymer 1968). White (2006) argued that the cleaver did not constitute a ‘discrete and deliberate form’ and was rather part of the continuum of overarching variation in handaxe morphology. He observed a low overall standardisation in cleaver morphology and technology; the ‘type’ consisted of a wide range of bifacial and unifacial supports for a roughly transverse cutting edge, commonly produced by a *tranchet* removal but sometimes resulting from ‘scraper-like’ retouch or simple bifacial knapping to produce an oblique or transverse edge. This is well illustrated by Cranshaw (1983), who focussed on cleavers from the five Group I sites of Baker's Farm, Furze Platt, Cuxton, Whitlingham and Keswick. An overview of the variability Cranshaw noted between cleavers is outlined in the summaries for these sites in chapter three.

Cranshaw (1983) noted that *tranchet* or *tranchet effect* removals, occurred on anywhere between 53% and 90% of cleavers from her five sites, and White (2006) supported the 'clear link' between cleavers and *tranchet* removals. Roe (1968a) did not break down his attribute analyses by planform shape, but the relatively high proportion of *tranchet* finished implements in his Group I sites (where cleavers were relatively more abundant) also suggests a link. For White (2006), the resharpening of round-tipped handaxes using the *tranchet* effect produced the characteristic cleaver morphology. Cranshaw (1983) took the opposing view, supported by White's later work, suggesting that normaltive social tradition and culturally directed design was important in producing the handaxe morphologies seen in the archaeological record (e.g., Shipton & White 2020; White in prep.).

7.4.2. Variations in cleaver typology.

Wymer (1968) provided for three variations of the cleaver type: the 'true' cleaver (type H), the sub-cordate – cleaver transitional type (type GH), and the ovate-cleaver transitional type (type HK). The proportions of these types, and key technological attributes, are shown below in table 7.2.

Table 7.2. A comparison of selected attributes for the 'true' cleaver (type H) and the two transitional cleaver types (GH, HK)

	n.	% of cleavers	Avg. L	% Tranchet removals	% Fully worked butts	% Cortex/ handaxe	% Made on flake	Avg. symmetry
H	122	52.81	127.03	50	50	15.33	4.92	5.26
GH	42	18.18	134.76	26.19	48.84	11.79	4.76	5.16
HK	67	29.00	119.13	38.24	70.15	10.22	4.48	4.60

The data presented here suggests that both pre-determined design and *ad hoc* resharpening might have contributed to the range of morphologies visible in the MIS 9 record. There appears to have been a cleaver signature unrelated to any other type which would not easily have been formed through resharpening; these were recorded as Type H. Type H included the 'fan-shaped' cleavers mentioned by Roe (1968a, 1981), with wide, flat or slightly convex tips and edges converging towards a partially or fully-worked convergent butt. This type was recorded as 'divergent' by Cranshaw (1983), who identified the V-shaped butt on type H handaxes as a distinguishing feature. Examples of this type are shown below in figure 7.5. 'Fan-shaped' cleavers were always metrical cleavers (i.e., their planform index value always exceeded 0.55), and always had high tip-shape index values (B1/B2 > 1). Around 11% of the type H cleavers were convincing fan-shaped cleavers, although the precise number was found hard to determine as the form graded into more square-sided morphologies outlined below.

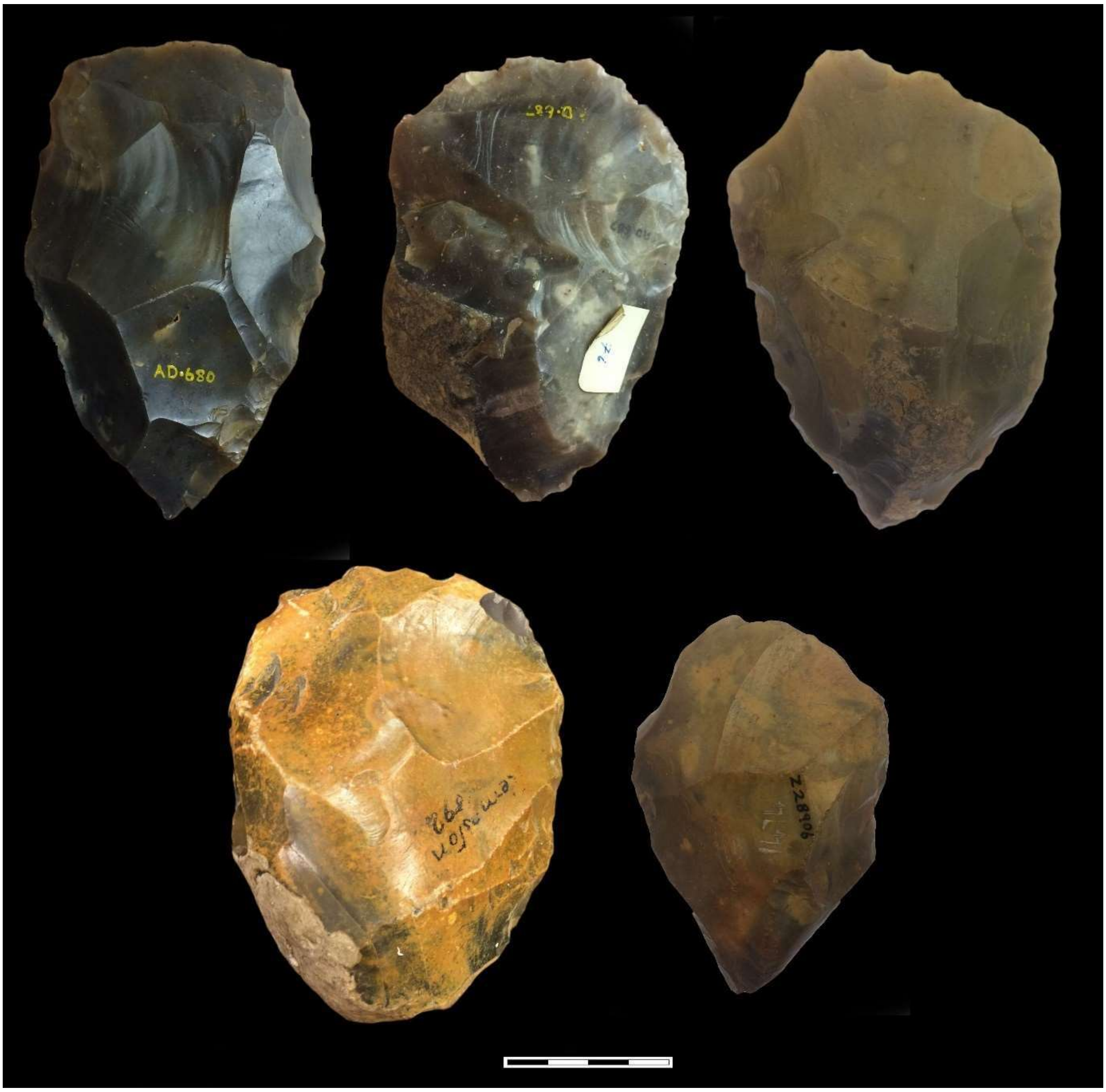


Figure 7.5. Examples of 'fan-shaped' or divergent cleavers, from (top row, left to right) Furze Platt, Furze Platt, Warsash, (lower row, left to right) Kempston, Cookham.

The remaining Type H cleavers were generally square with roughly parallel left and right edges, resulting in tabular forms. Examples of these types are shown below (figure 7.6). Around 89% of the type H cleavers recorded were approximately straight-sided, although it was again difficult to judge the proportion of these objects accurately as they graded imperceptibly into both ‘fan-shaped’ forms and cleaver-ovate and cleaver-sub-cordate transitional forms. Many of these latter type H handaxes could be classed either as ‘crude’ or ‘irregular’ cleavers (i.e., type D handaxes with a transverse cleaver tip), or ‘heavy-duty’ cleavers (c.f., Cranshaw 1983), a type particularly common at Barnham Heath but present across all geographic regions. These latter tended to be massive tools, often with cortical grips and again with parallel edges. Examples of 'heavy-duty' cleavers from Barnham Heath are shown below in figure 7.7.

Figure 7.6. Examples of approximately square-sided cleavers, from (left to right) Biddenham, Stoke Newington, Stoke Newington.

Figure 7.7. 'Heavy-duty' cleavers from Barnham Heath, with irregular (left) and square-sided planforms (centre, right). Each has retained cortex which could have functioned as a grip or handle.

7.4.3. Transitional cleaver types.

No other type is characterised by either a fan-shaped or square-sided planform (Wymer 1968), making type H cleavers unlikely to be the result of *ad hoc* resharpening. These 'true' cleavers were accompanied by hybrid types (types GH and HK) which *could* conceivably have resulted from the resharpening of type G or type K handaxes, although this should not necessarily be assumed. Examples of these transitional types are shown below (figure 7.8). Wymer (1968) also introduced a type JH, but only applied it to an unusual cordate-cleaver type at Grovelands Pit – no handaxes of type JH were identified in the present study.

Figure 7.8.9 Irregular (left) and transitional GK (centre) and HK (right) types.

7.4.4. Cleaver technological attributes.

Key characteristics of cleavers from all sites are shown above in table 7.2 (above). The proportion of cleavers of any type made on flakes was generally low (<5%), consistent with observations in Cranshaw (1983) and White (2006). Interestingly, the flake-cleaver was marginally rarer than handaxes of any other type being made on a flake (6.36% of the total), quite at odds with the occurrence of large numbers of flake-cleavers in African assemblages such as Olduvai Gorge (Leakey 1975), Isimila (Howell et al., 1962) and Olorgesailie (Isaac 1977), and certain Iberian assemblages of African affinity (LFA) which are typified by flake-cleavers and trihedral picks (Mendez-Quintas et al., 2020).

Tranchet removals were significantly more common on all three cleaver sub-types (types H, GH, HK) than in all other handaxes types combined (6.48%), again consistent with previous observations that *tranchet* finishing was associated with cleavers in Britain (Wymer 1968; Cranshaw 1983; White 2006). *Tranchet* removals were more common on 'purpose built' (type H) cleavers than on 'hybrid' (type GH, HK) cleavers; this is somewhat contrary to the suggestion that *tranchet* removals represented the resharpening of other rounded types. This being the case, the application of a tranchet finish to a type H handaxe may simply represent sharpening or finishing rather than *re*sharpening in the strict sense. Around half of the type H cleavers had a fully worked butt, with a similar number for type GH and rather more for type HK. The tendency for type HK cleavers to have fully worked butts probably relates to the original type K handaxe form, which often had fully worked butts and all-round cutting edges (Wymer 1968; White 1998b). The relatively high frequency of fully worked butts in type H and type GH handaxes is harder to explain, as cleavers in general had very low proportions of all-round working edges (White 2006). This suggests that the shaping of the butts of cleavers was undertaken for some other reason than the production of a working edge. *Tranchet* finishing may have represented resharpening of hybrid type GH and HK cleavers, however this was clearly not systematic as it occurred in only 26.19% and 38.24% of the measured examples respectively. Nor can cleavers be viewed as exhausted tools, sharpened and resharpened to the limits of their usefulness, as the type H cleavers were generally relatively large (average L=127mm). Furthermore, both type GH (135mm) and HK (119mm) cleaver hybrids were onaverage larger than type G (127mm) and type K (97mm) respectively. This strongly suggests that larger tools were preferentially selected for resharpening into cleavers, if resharpening was indeed a factor behind cleaver production in these cases.

The picture of great variability within the cleaver type may be interpreted as evidence of behavioural and technological flexibility; the hominin knapper was perfectly able to design and produce a distinctive fan-shaped or tabular cleaver to a pre-determined mental template but was equally willing to quickly produce the desired working edge through more expedient means (i.e., resharpening of a suitably sized sub-cordate or ovate handaxe). The range of cleaver morphologies found even at an intra-site level is shown below in figure 7.9.

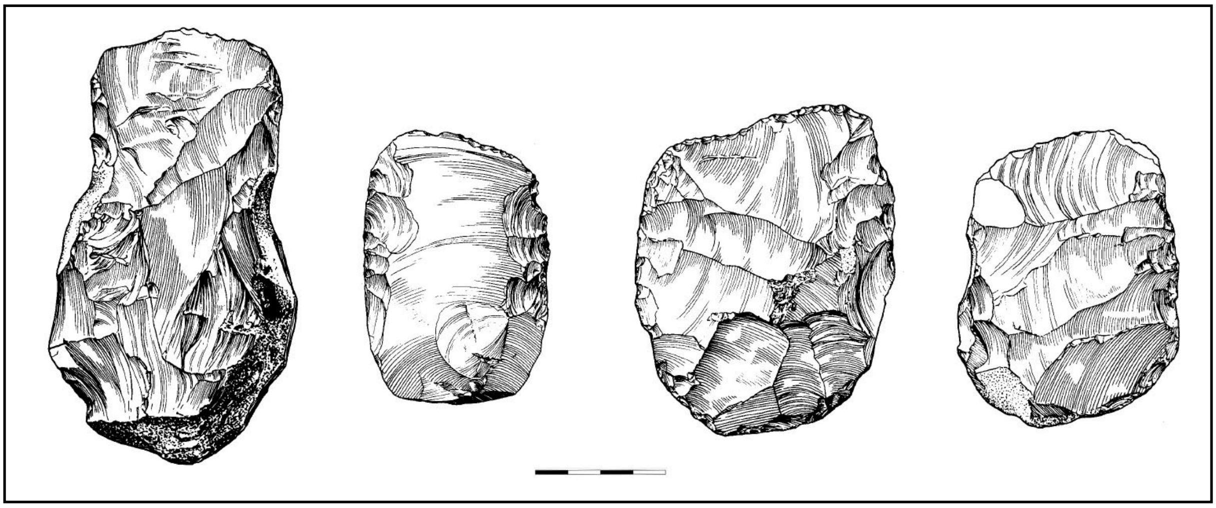


Figure 7.9. Four cleavers with different morphologies from Wymer (1985). Three (left, centre right and right) have tranchet removals; one (centre left) is made on a flake, an unusual feature in the British record. Handaxes from Whitlingham (left, left centre) and Keswick (right centre, right).

7.4.5. Ficrons.

Ficrons, when found alongside cleavers, have been suggested to form part of a chronologically restricted pairing characteristic of MIS 9 handaxe assemblages (e.g., Wenban-Smith 2004; Bridgland & White 2014, 2015, 2018; White 2015; White & Bridgland 2017). A cursory examination of the relevant literature would appear to support this suggestion with large, spectacular ficrons prominently illustrated in recent papers describing MIS 9 sites including Warsash (Davis et al., 2016, 2021b), Seven Kings (Taylor 2019), Canterbury West (Knowles, forthcoming), and Cuxton (Wenban-Smith 2004, 2006) among many other sites where cleavers were also found; a selection of these are shown in figure 7.10. Roe (1968a, 1981) had also commented on the co-occurrence of ficrons and cleavers in his Group I sites, offering further support to the significance of the pairing.

Figure 7.10. Examples of the often large and spectacular ficrons illustrated in published literature, including examples from Cuxton (left) (Wenban-Smith 2004, Fig. 3), Warsash (centre left and right) (Davis et al., 2016, Fig. 8) and Seven Kings (right) (Taylor 2019, fig. 2).

The inclusion of images of large ficrons in publications is certainly the result of a bias in presentation rather than a reflection of the prevalence of the type, and an understandable one: ficrons are visually striking, large and often well-made objects (a point given further consideration below). Despite the prominence of the type in published works, there is some disagreement over what constitutes a ficron, stemming in part from terminological differences between French and British scholarship. Bordes (1961) characterised the *ficron* as a handaxe sharing the planform outline of *bifaces lanceoles* and *bifaces micoquiens* (i.e., pointed types with biconcave edges), except that they were crudely made in comparison to the latter two types. Examples of this type are shown below in figure 7.11.

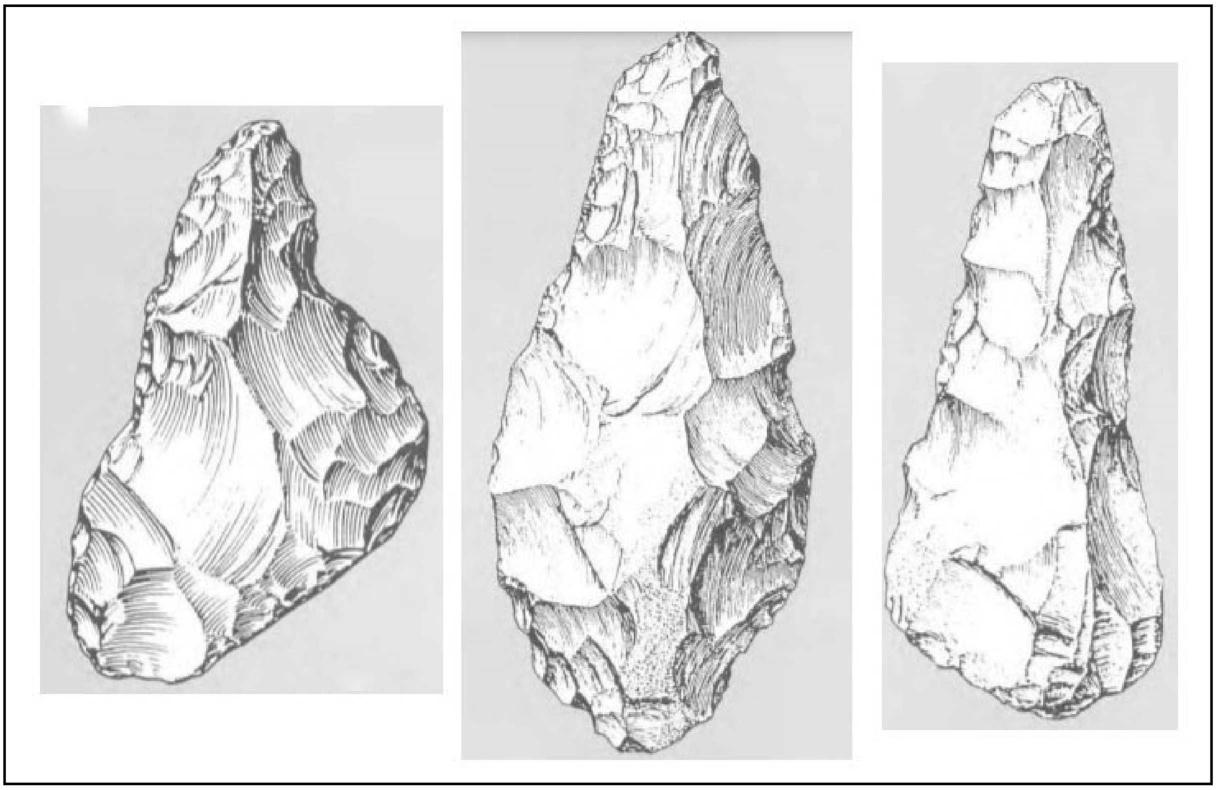


Figure 7.11. 'Ficrons' according to the typology of Bordes (1961), after Debénath & Dibble (1993), Figures 11.31 - 11.33. Scale not known.

In contrast to the French usage, Wymer's definition of the ficron (type M) handaxe theoretically encompassed any handaxe with 'symmetrical concave edges', although this seems not to have been applied in practise (discussed below) (Wymer 1968). Symmetrical biconcavity on opposing edges was the single key defining feature of the type, as Wymer noted that the point of the handaxe may be either 'acute' or 'ogee', and the butt may be either cortical or worked. Wymer noted that ficrons tended to be uncommon and 'relatively large' (Wymer 1968). Wymer's typology accommodated an intermediate pointed – ficron form (type FM), but he did not provide a description for this type. The example illustrated on his interpretative key (figure 4.4.) suggested a less refined ficron, with a partially or wholly corticated butt and perhaps less intensive reduction (i.e., fewer flake removals). Roe's observation of ficrons and cleavers in Group I assemblages is likewise ambiguous, and it is worth noting that any pointed handaxe with a low tip-shape index value appears as a ficron on Roe's own interpretative key (Appendix II; Roe 1968a).

Wymer's observation that type M handaxes were 'uncommon' is something of an understatement when his data are examined. Wymer provided tabulated analyses of many of the larger sites on the Thames terraces using his typological scheme in addition to simple size and condition observations. The typological component of these data is shown below in Appendix IV**,** reformatted according to the scheme used in the present study. Sites attributable to the Lynch Hill terrace or its upstream and downstream correlatives by Wymer are highlighted, although there are several sites in the lower reaches which may relate to the Lynch Hill terrace but have not been positively identified as such, particularly in the London area where the bluff between the Lynch Hill and Taplow terraces is less pronounced (Wymer 1968). Only two type M ficrons were identified, both from Cookham Rise, from a total sample of 5091 handaxes (0.04% of the total). Transitional type FM handaxes fared only a little better, with 36 identified (0.71% of the total). Of these, 27 originated from sites attributable with some confidence to MIS 9 (75% of the type FM handaxes). Whilst this would appear to show some sort of chronological significance for the type, it is worth highlighting that 20 of the 25 MIS 9 sites in Wymer's study (80%) lacked ficrons of either M or FM types. Those which did have ficrons were almost all in the Middle Thames area; even exceptionally large assemblages in the Lower Thames, such as Stoke Newington and Hanwell, had only a single example of type FM; most had no representation at all.

There are caveats to this apparent pattern. Wymer figured several large ficrons (type M) from Cannoncourt Farm Pit (Furze Platt) but did not include them in his tabulated data, possibly because they originated from different museum collections to those he had regular access to. In addition, Wymer illustrated several handaxes which would seem to satisfy his basic criteria for a type M/FM handaxe (i.e., biconcave edges) which he assigned to his type F or type E.

As such, whilst the present study attempted to follow Wymer's typological scheme as closely as possible to allow inter-analyst comparison, updated criteria for identifying ficrons were needed. Cranshaw (1983) provided much needed clarification on what constitutes a ficron, breaking the type down into three sub-types. Cranshaw's typology is shown below in table 7.3.

Table 7.3. Cranshaw's typology for ficrons, the basis for the identification of ficrons in the present study. Modified after Cranshaw (1983, 107).

Type	**Description**
'True' ficrons	*Implements with L_1 falling in the lowest third of the tool (i.e., pointed by Roe's (1968a) methodology), with an average length of incurving edge greater than 40% of the length of the tool on the longitudinal axis, and with B_1 greater than $0.5*B_{mid.}$*
Ficron related tools	*Implements with biconcave edges but which did not meet the three criteria outlined above for 'true' ficrons.*
Demificrons	*Implements with one straight and one concave edge, but which in all other ways met the criteria for a 'true' ficron.*
(Broken ficrons/ demificrons)	*Either tipless objects, or tips themselves, where a ficron or demificron type can reasonably be suggested.*

The fact that other analysts have identified ficrons in greater proportions than Wymer at other supposed MIS 9 sites suggests that the more inclusive form advocated by Cranshaw is already in wide use, thereby justifying its use here. Cranshaw's criteria do not explicitly exclude crudely made biconcave handaxes, whereas Wymer's typology clearly intended a type M ficron to be a well-made implement. The present study takes something of a middle road by classifying crude pointed handaxes with biconcave edges as 'ficron related tools'; crude pointed handaxes with one pronounced biconcave edge are also included in this group, although they would perhaps correctly be termed 'demificron related tools'. Well-made, symmetrical tools are classed as 'true ficrons' according to Cranshaw's criteria; these were recorded as type M. Handaxes which fit Cranshaw's classification but would not satisfy Wymer's more stringent criteria are classed as 'marginal ficrons'; these were recorded as type FM with biconcave edges. Wymer provided no distinct type for the demificron; these were recorded here as type FM with the attribute of one straight edge opposing a concave edge. The sub-divisions of ficron are summarised below in table 7.4. In practise, each sub-division graded imperceptibly into the next: a 'true' ficron was only subjectively distinct from a 'marginal' ficron, and so forth.

Table 7.4. A table summarising the key sub-types of ficron, using Wymer (1968) and Cranshaw (1983) as a baseline.

Ficron sub-division	Wymer type	Recorded attributes	Notes
Ficron	M	Pronounced biconcave edges; symmetrical and well-worked tool. Satisfies Cranshaw's criteria.	These types were notably rare in Wymer's analysis.
Demificron	FM	Concave edge opposing straight edge; satisfies Cranshaw's criteria.	Wymer's typology did not provide for demificron handaxes.
'Marginal' ficron	FM	Weakly biconcave edges; sometimes less symmetrical or with greater retained cortex. Satisfies Cranshaw's criteria, but would probably not have been classed as a type M by Wymer.	This is probably the usage of type FM which Wymer originally intended, based on his figured examples.
Ficron related tool	Any type except type FM and M (often D, E and variants)	Biconcave edges but failing to meet Cranshaw's criteria.	
Demificron related tool	Any, except type FM and M (often D, E and variants)	Concave edge opposing straight edge, but otherwise	These were generally recorded as 'lopsided' or macroscopically asymmetrical

	failing to meet Cranshaw’s criteria.	handaxes rather than demificrons.

7.4.6. Ficron related tools.

Ficron-related tools were easily identifiable by searching the object database for handaxes which i) had bi- or uni- concave edges in planform and ii) were assigned a type other than FM or M (i.e., where the incurving edge was judged to extend for less than 40% of L, or where B_1 was less than $0.5*B_{mid}$). In practise, such handaxes were almost all crude types (D, DF, E, EF) along with a handful of pointed types (F, FG) where the incurvature appeared to be accidentally imposed or the result of qualities inherent in the raw material. A selection of ficron-related tools from a range of sites is shown below in figure 7.12.

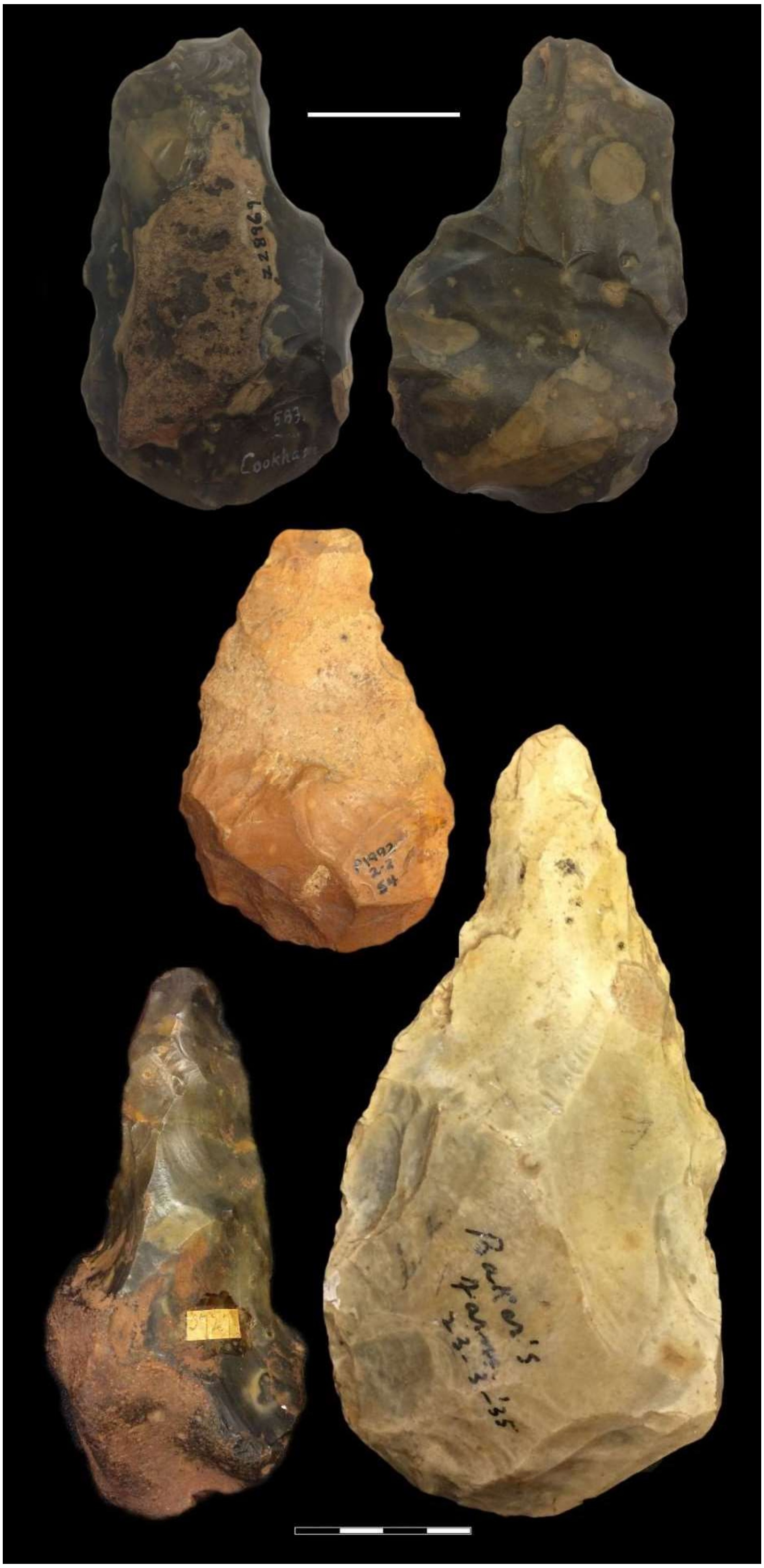


Figure 7.12. A selection of handaxes which meet the requirements for a 'ficron-related tool', akin to Bordes' ficron (Bordes 1961). Handaxes from Cookham (top, dorsal and ventral shown), Kempston (middle), Stoke Newington (lower left) and Baker's Farm (lower right) are shown. The Kempston and Baker's Farm examples would almost certainly also qualify as lopsided handaxes (Hosfield & Green 2013), and there is a high degree of overlap between ficron-related tools and lopsided handaxes.

66 ‘ficron related tools’ were identified at the following sites (table 7.5):

Table 7.5. A table summarising the prevalence of ficron related implements in British MIS 9 assemblages; these data are not available for Aylesford, Ham Hill or Bromham.

Site	n. ficron related tools	% of assemblage
Baker’s Farm	1	3.13
Biddenham	2	1.68
Cookham	3	2.43
Cuxton	3	1.52
Dunbridge	1	0.97
Furze Platt	11	2.08
Hillingdon L.B.	2	1.87
Kempston	4	2.56
Lent Rise	3	2.38
Leyton	4	5.33
Lower Clapton	3	5.88
Reculver	3	4.11
Ruscombe	1	0.91
Stoke Newington	16	5.90
Thetford	1	1.59
Twydall	1	2.27
Warsash	8	5.13
Barnham Heath, Canterbury West, Farnham, Iver, Keswick, Wolvercote	0	0
Total	66	

Ficron-related tools were identified in low proportions (0 – 6%) across sites in all regions with no clear geographical patterning, although proportions were found to be relatively high at Stoke Newington and nearby areas. This may simply have been a reflection of the greater proportion of smaller crude handaxes in Group IB assemblages. Given the rather loose criteria for defining a ficron-related tool, it is difficult to judge how significant the occurrence of these implements is: it is tempting to regard them as ‘proto-ficrons’, and this may apply in certain cases. Other cases may simply be the result of irregular workmanship or reflect flawed raw material.

7.4.7. Marginal ficrons.

Marginal ficrons were identified by a) biconcave edges and b) either, but not both, of Cranshaw’s two additional criteria. In practise, they were identified as well-made pointed handaxes with the suggestion of incurving edges but lacking the highly exaggerated bottleneck form of the ‘true’ ficrons. Such handaxes have occasionally been called ‘demi-ficrons’ in previous work, as in the example below from Hardaker (2015) (figure 7.13).

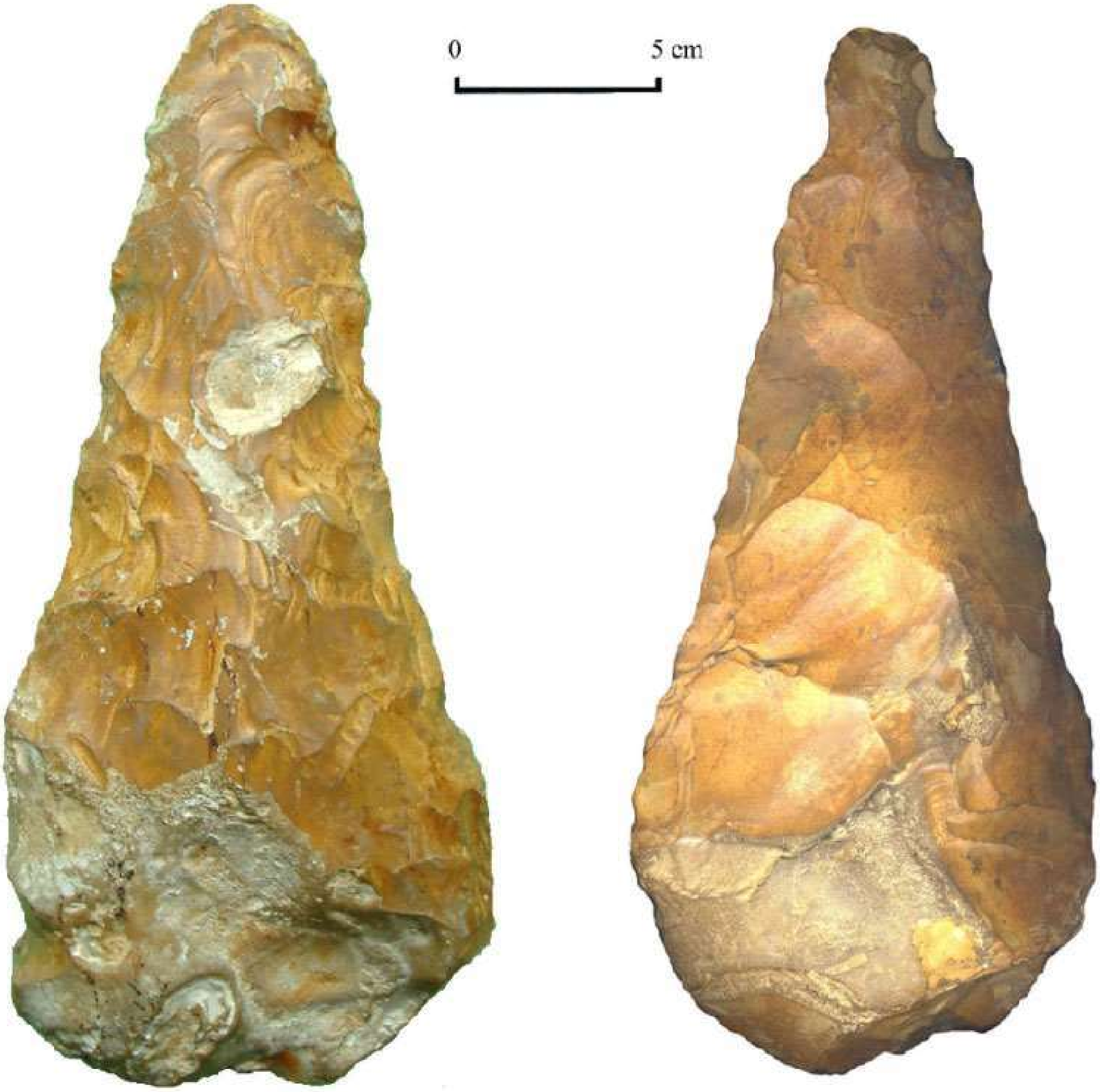


Figure 7.13. 'Demi-ficrons' from Gravelly Guy (Stanton Harcourt, left) and Witney (right) from Hardaker (2015, Fig. 2). These handaxes would be classed as 'marginal ficrons' in the present study.

Marginal ficrons transitioned from ficron-related tools and transitioned into ‘true’ ficrons, much as Wymer’s types transitioned from one to the next. Two marginal ficrons from Furze Platt are shown below in figure 7.14.

Figure 7.14. A pair of 'marginal' ficrons, both from Furze Platt.

51 ‘marginal ficrons’ were identified at the following sites (table 7.6).

Table 7.6. A table summarising the prevalence of marginal ficrons in British MIS 9 assemblages. These data are not available for Aylesford, Ham Hill or Bromham.

Site	n. marginal ficrons	% of assemblage
Baker's Farm	1	3.13
Barnham Heath	1	1.20
Biddenham	2	1.68
Canterbury West	1	5.88
Cookham	5	4.07
Cuxton	5	2.54
Dunbridge	1	0.97
Furze Platt	17	3.21
Iver	2	1.44
Kempston	4	2.56
Lent Rise	3	2.38

Leyton	1	1.33
Ruscombe	3	2.73
Stoke Newington	3	1.11
Warsash	2	1.28
Farnham, Hillingdon L.B., Keswick, Lower Clapton, Thetford, Twydall, Wolvercote.	0	0
Total	51	

Marginal ficrons occurred in low proportions (0 – 5.88%) across sites in all regions with no apparent geographical patterning.

7.4.8. 'True' ficrons.

'True' ficrons satisfied both Wymer's and Cranshaw's various criteria and were always recorded as type M with the biconcave edge attribute. A selection of type M ficrons from various sites is shown below in figure 7.15.

Figure 7.15. A selection of 'true' ficrons, which satisfied both Wymer's and Cranshaw's requirements for the type. From (top row left - right) Cuxton, Twydall, Keswick, Wolvercote, (lower row left - right) Furze Platt, Farnham, Furze Platt, Furze Platt.

49 ‘true’ ficrons were identified at the following sites (table 7.5):

Table 7.5. A table summarising the prevalence of ficrons in British MIS 9 assemblages.

Site	no. ficrons	% of assemblage
Aylesford	1	1.15
Baker's Farm	3	9.38
Canterbury West	1	5.88
Cuxton	10	8.13
Dunbridge	1	0.97
Farnham C	1	3.70
Furze Platt	16	3.02
Hillingdon L.B.	2	1.87
Iver	3	2.16
Kempston	2	1.28
Keswick	2	8.00

Lent Rise	1	0.79
Ruscombe	2	1.82
Stoke Newington	1	0.37
Thetford	2	3.17
Twydall	1	2.27
Warsash	1	0.64
Wolvercote	1	2.44
Biddenham, Barnham Heath, Bromham, Cookham, Ham Hill, Leyton, Lower Clapton, Reculver, Wolvercote.	0	0
Total	49	

'True' ficrons occurred in variable proportions (0 – 9.38%) with high proportions at Baker's Farm, Cuxton and Keswick and generally very low proportions at the suggested Group IB sites.

7.4.9. Demificrons.

Demificrons were recorded as type FM with the attribute of a concave edge opposing a straight edge. The incurving edge extended for more than 40% of L, in line with Cranshaw's criteria. A selection of demificrons from different sites is shown in figure 7.16.

Figure 7.16. A selection of demificrons, from (top row, left - right) Furze Platt, Cuxton, Twydall, (lower row) Furze Platt, Furze Platt, Cuxton.

A total of 43 demificrons were identified at the following sites (table 7.8):

Table 7.8. A table summarising the prevalence of demificrons in British MIS 9 assemblages. These data are not available for Aylesford, Ham Hill or Bromham.

Site	no. demificrons	% of assemblage
Baker's Farm	3	9.38
Biddenham	1	0.84
Canterbury West	1	5.88
Cookham	1	0.81
Cuxton	6	3.05
Furze Platt	11	2.08
Hillingdon L.B.	1	0.93
Iver	3	2.16
Kempston	5	3.21
Lent Rise	2	1.59
Leyton	1	1.33
Reculver	2	2.74
Ruscombe	5	4.55

Twydall	1	2.27
Barnham Heath, Dunbridge, Farnham C, Lower Clapton, Stoke Newington, Thetford, Warsash, Wolvercote	0	0
TOTAL	43	

Again, demificrons occurred in low but variable proportions (0 - 9.3%) across all regions with no obvious geographical patterning.

7.4.10. Ficrons summary.

Ficrons (either as 'true' ficrons, demificrons or ficron-related tools) seem to occur in small but measurable proportions across most sites thought to date to MIS 9. Of the sites with large sample sizes (50+ objects), only Lower Clapton lacked ficrons of any type, and the absence of evidence should not be taken as evidence of absence in this case given the low numbers of ficrons reported elsewhere. Following the methodologies of Wymer (1968) and Cranshaw (1983), fewer sites can be said to have 'true' ficrons, and several more have only a single convincing example. Even so, this study consistently recorded ficrons at MIS 9 sites, spread across a wide geographical range. The fact that convincing demificrons occurred in broadly similar numbers to 'true' ficrons is notable and may suggest a relationship between the two tool-types. The demificron as a discrete type is generally overlooked, yet it appears to be at least as numerically important in MIS 9 assemblages as 'true' ficrons, and merits further discussion.

7.5. Giant Handaxes.

MacRae (1987) compiled a brief list of the largest British handaxes known to him. The list was by no means exhaustive, and the article was intentionally light-hearted, but nevertheless a revisitation of MacRae's 'Great Giant Handaxe Stakes' is overdue.

MacRae listed the top six largest handaxes, judged by length, to which he added his own entry from Stanton Harcourt. These were as follows (date of discovery in parentheses):

1. Furze Platt, pointed, (1919), 323mm, shown in figure 7.17.
2. Shrub Hill, pointed, (1869), 285mm.
3. Stanton Harcourt, demi-ficron (1987), 269mm.
4. Sonning Town, ficron, (1932), 266mm.
5. Warren Hill, ovate, (1932), 260mm.
6. Wolvercote, plano-convex (1904), 244mm.
7. Romsey, pointed (1968), 235mm.

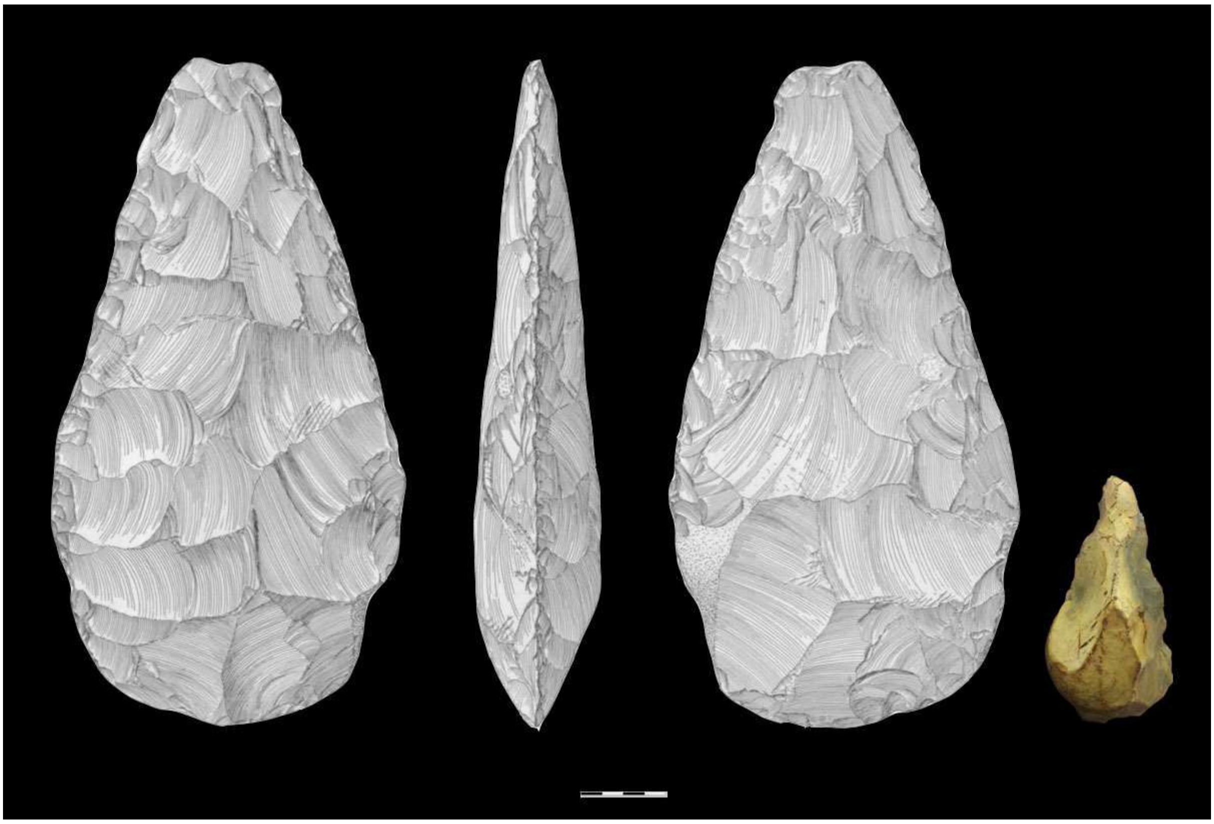


Figure 7.17. The colossal Furze Platt Giant, reproduced from Lacaille (1940) with an 'average' sized handaxe (L=117mm) shown to the right for comparison.

7.5.1. Chronological patterning of giant handaxes in Britain.

Two observations may be made immediately. The first is that 6 of the 7 entries have pointed morphologies (pointed, ficron, demi-ficron, and 'Wolvercote-type' plano-convex). The second is the age of the sites. Shrub Hill and Warren Hill are probably of pre-Anglian age (Westaway 2009; Hosfield 2011b; Hardaker 2012; Lewis et al., 2021). Warren Hill was part of Roe's Group V (coarse, narrow, irregular), although the typological composition of Warren Hill and Shrub Hill was not closely similar (Wymer 1985). It is not clear where 'Romsey' is in this case, as there are several pits in the Solent at or near Romsey; presumably, MacRae was referring to one of two pits at Romsey Extra on Terrace 4 of the Test, although there are a number of pits in the area and the distinction between T4 and T5 is not always clear (Briant et al., 2012; Davis et al. 2021b). Assuming the correlation of the Test Terrace 4 with Dunbridge and thus MIS 9 (Westaway et al., 2006), then all five of Romsey, Furze Platt, Wolvercote, Sonning Town and Stanton Harcourt can be dated to the final expressions of the Acheulean in Britain (MIS 9 or MIS 7) (Wymer 1968; Bridgland 1994; Lee 2001; Westaway et al., 2006). Even accepting the small sample size, and the fact that MacRae's research into giant handaxes may not have been exhaustive, there is the suggestion of a pattern of giant handaxes in the latest Lower Palaeolithic.

A handful of other giants would have made it onto MacRae's list but were either missed by MacRae, or were discovered or published since his original article. All five are from sites of suggested MIS 9 age.

1. Cuxton, ficron, 307mm, (Wenban-Smith 2004, 2006).
2. Canterbury West, ficron, 285mm (Knowles, forthcoming).
3. Broom, shape unknown, 282mm (Hosfield & Green 2013).
4. Biddenham, pointed, c. 240mm, '*the Big Boy of Biddenham*' (Evans 1872; Emery 2010).
5. Seven Kings, ficron, 238mm (Taylor 2019).

In addition, the following handaxes from the present study would have broken into MacRae's list:

1. Warsash, sub-cordate/ovate, 262mm.
2. Cuxton, pointed, 254mm.
3. Warsash, ficron, 253mm.
4. Cuxton, pointed, 249mm.
5. Warsash, pointed, 248mm.
6. Keswick, pointed/ sub-cordate, 245mm.
7. Furze Platt, ficron, 242mm.
8. Furze Platt, demi-ficron, 237mm.

There is no agreed definition of what constitutes a 'giant' handaxe although the handaxes listed above would almost certainly qualify. Given that the focus of this study is solely on MIS 9 handaxes, it is natural that more giants should have been added to MacRae's list from that period. However, there does seem to be a genuine preference for a) giant types with pointed or ficron planform shapes and b) giant handaxes in the latest Lower Palaeolithic (MIS 9). This may be tested in a limited way through consultation of data from the thesis of M. White (White 1996) and the Marshall et al., (2002) ADS Database, which provide metrical data for British sites from a range of time periods. Handaxes exceeding certain thresholds which might be called 'giants' are shown, along with probable ages, in table 7.9. below (number of handaxes in parentheses).

Table 7.9. A table comparing the proportion of 'giant' handaxes (in three size brackets) at selected British sites, showing a high degree of chronological patterning. Data from White (1996) and the Archaeological Data Service Database (Marshall et al., 2002).

Site	Assemblage size	Greater than 150mm	Greater than 200mm	Greater than 230mm	Probable age
Fordwich*	136	41.18% (56)	2.21% (3)	0% (0)	MIS 13 – 15 (Bridgland & White 2014)

Boxgrove**	183	10.93% (20)	0% (0)	0% (0)	MIS 13 (Roberts & Parfitt 1999)
High Lodge*	66	10.61% (7)	(0)	(0)	MIS 13 (Rose 1992)
Warren Hill**	341	6.16% (21)	0% (0)	0% (0)	Pre-Anglian (Rose 2009; Hardaker 2012)
Corfe Mullen**	138	15.22% (21)	0% (0)	0% (0)	Unknown (Marshall et al. 2002), possibly pre-Anglian (McNabb et al., 2012).
Hitchin*	64	20.31% (13)	0% (0)	0% (0)	MIS 11 (Bridgland & White 2014)
Swanscombe UMG (Wymer coll.)*	122	2.46% (3)	0% (0)	0% (0)	MIS 11 (Bridgland & White 2014)
Dovercourt*	117	4.27% (5)	0% (0)	0% (0)	MIS 11 (Bridgland et al., 1990)
Elveden*	68	7.36% (5)	0% (0)	0% (0)	MIS 11 (Ashton et al., 2005)
Foxhall Road**	5	0% (0)	0% (0)	0% (0)	MIS 11 (White & Plunkett 2004)
Wansunt Pit*	32	0% (0)	0% (0)	0% (0)	MIS 11 (Wenban-Smith & Bridgland 2001)
Bowman's Lodge**	29	0% (0)	0% (0)	0% (0)	MIS 11 (Bridgland & White 2014)
Cuxton**	214	20.56% (44)	3.27% (7)	0.93% (2)	MIS 9
Broom**	253	22.13% (56)	2.37% (6)	0.79% (2)	MIS 9
Wolvercote*	51	15.69% (8)	5.88% (3)	1.96% (1)	MIS 9
Whitlingham*	132	16.67% (22)	2.27% (3)	1.52% (2)	MIS 9
*** Data from White (1996); ** Data from the ADS database (Marshall et al., 2002)**					

Although limited in range this does appear to show that MIS 9 assemblages tended to include large handaxes (>150mm) in greater proportions than sites from other periods, and true giants (>230mm) in small proportions where they were entirely absent from assemblages from other periods. The table above compares length (L) only; the fact that giant handaxes tend to be points or ficrons mean that direct comparison with ovate dominated assemblages such as Boxgrove are less reliable, but the overall impression is clear; MIS 9 sites had a greater proportion of large and giant handaxes than sites of any other age.

7.5.2. Possible variation within MIS 9.

Patterns of variability in the occurrence of giants may be sought within the MIS 9 sites featured in this study. This may be a valuable avenue to explore as giant handaxes would not be susceptible to negative collector's biases even at otherwise poorly collected sites. Nor would local raw material limitations necessarily preclude the manufacture of giants; handaxes from both Stanton Harcourt and Wolvercote appear on MacRae's (1987) list, and a 194mm ficron was reported from Berinsfield by Lee (2001), none of which are close to a source of good quality local flint (Tyldesley 1986; Lee 2001; Ashton 2008). Selected sites are shown below (table 7.10.), chosen for their geographical distribution and large sample sizes.

Table 7.10. A table comparing the prevalence of 'giant' handaxes at selected MIS 9 sites.

Site	Sub-group affinity	Sample size	Greater than 150mm	Greater than 200mm	Greater than 230mm
Biddenham	IB	119	10.92% (13)	0% (0)*	0% (0)*
Kempston	IB	120	2.5% (3)	0% (0)	0% (0)
Stoke Newington	IB	232	7.72% (4)	0% (0)	0% (0)
Cookham	IA	123	11.38% (14)	1.63% (2)	0.81% (1)
Cuxton	IA	175	19.43% (34)	4.57% (8)	1.71% (3)
Furze Platt	IA	499	18.24% (91)	2.20% (11)	0.60% (3)
Hillingdon L.B.	IA	99	15.15% (15)	2.02% (2)	0% (0)
Warsash	IA	148	31.76% (47)	6.08 (9)	2.03% (3)
* A ~240mm handaxe was reported from Biddenham (Evans 1872; Emery 2010).					

These results suggest that giant handaxes were generally rare across all sites but were almost completely absent from assemblages with sub-group IB affinity. The 'Big Boy of Biddenham' might suggest that giant handaxes were still a part of the lithic repertoire at these sites, but one which was not often chosen.

Trends across MIS 9 may be examined further through an analysis of the entire dataset. Of a total of 2354 handaxes recorded (from 24 sites), 100 were over 180mm in length. These were compared with the much larger sample of 2254 handaxes below 180mm in length for preferred type and degree of imposed symmetry using the FlipTest methodology (Hardaker & Dunn 2005).

7.5.3. Comparison of giant handaxes by type.

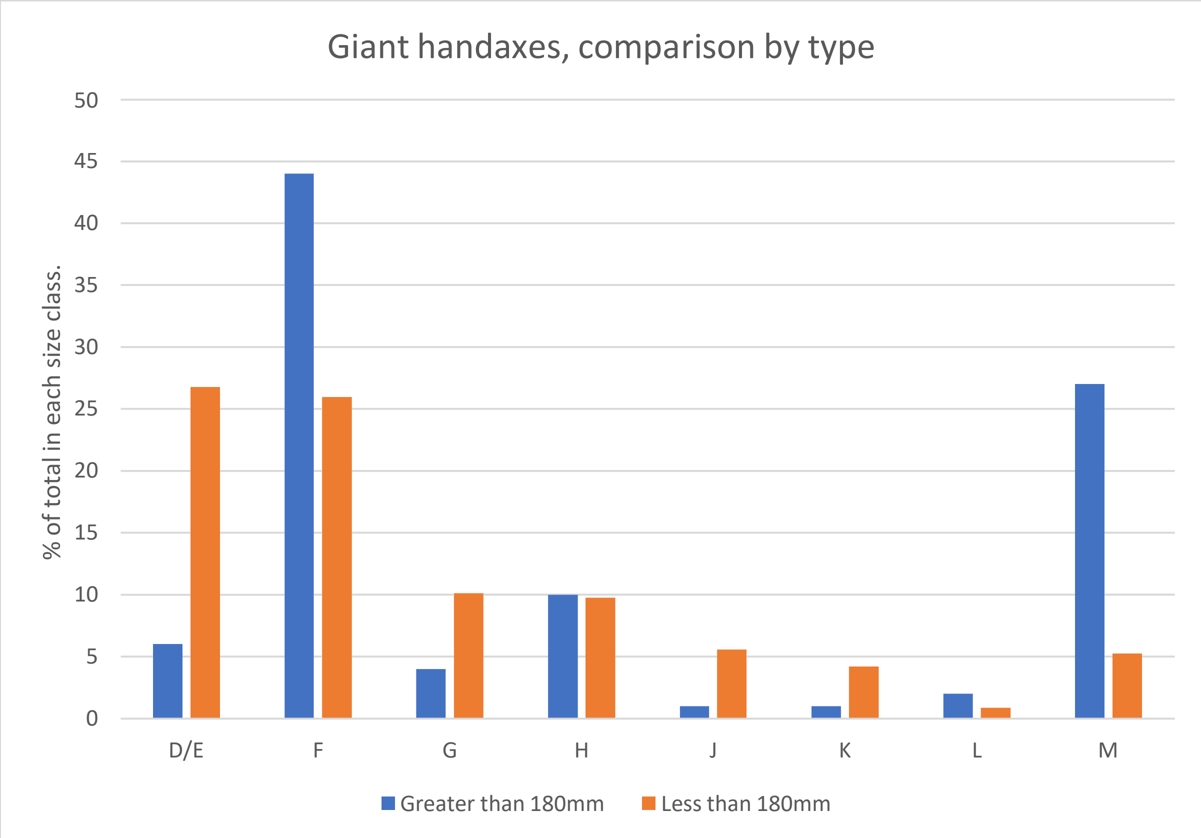


Figure 7.18. A graph to compare the relative abundance of larger (>180mm) and smaller (<180mm) handaxes by type. The graph shows the per-centage of each type in both size classes (>180mm, n=99; <180mm, n=2211). Ficrons and pointed handaxes were better represented in the larger class than the smaller; crude handaxes were far more abundant in the smaller class, presumably due to the large numbers of type E handaxes at some sites.

Figure 7.18 compares the broad type preferences in the larger and smaller handaxe size samples. There is a clear tendency for 'giants' to be manufactured as pointed and ficron types, a selection of which (in a variety of forms) are shown below in figure 7.19.

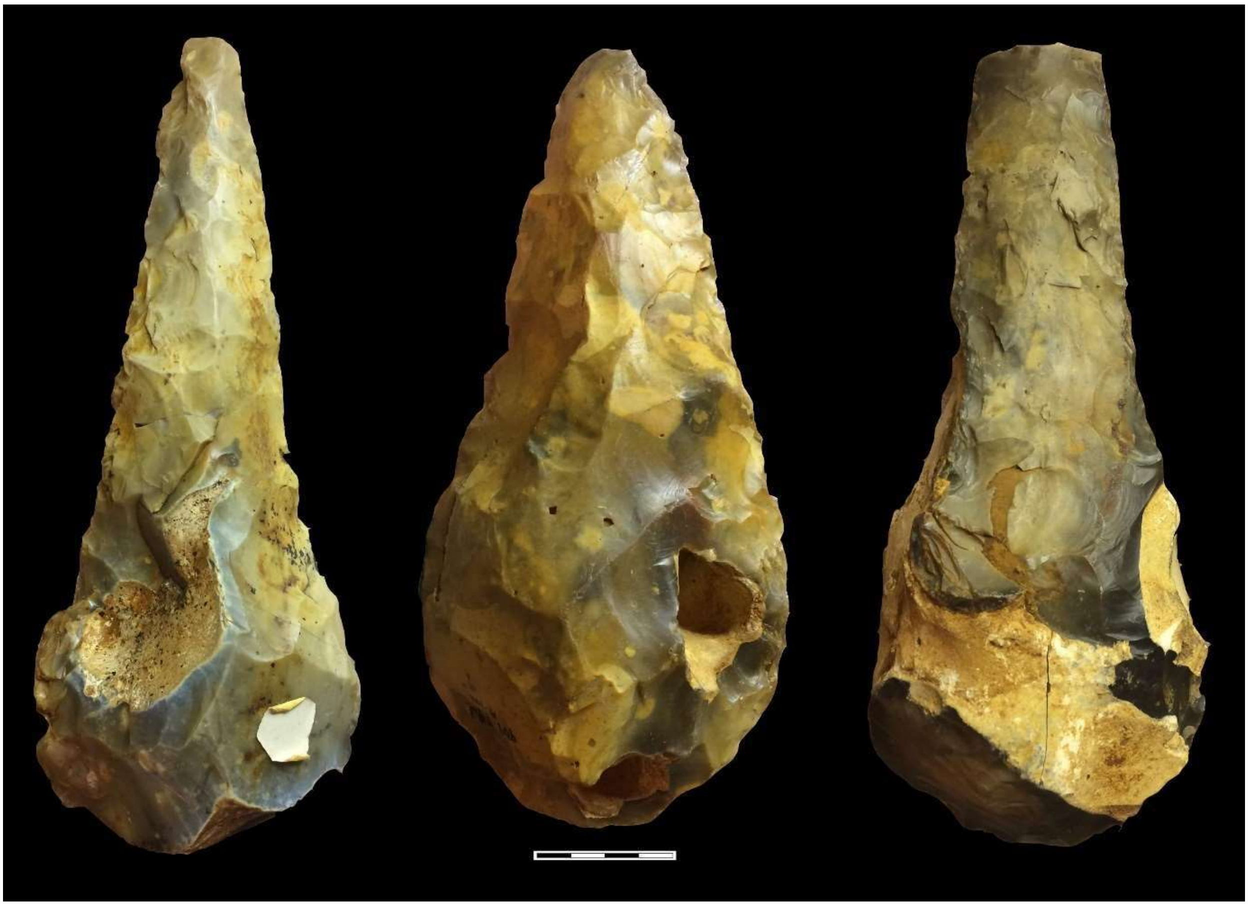


Figure 7.19. Three giant Furze Platt handaxes. Giant handaxes tended to be either pointed (centre) or ficron (left, right).

Ficrons are significantly better represented in the 'giant' group than the sub-180mm group. The smaller number of crude giants is partly the result of there being no small, crude types (type E) greater than 100mm, but it is nevertheless true that very few of the giants was crudely made. Sub-cordate types, which often tended towards crudity, were likewise better represented in the sub-180mm sample. Cordates, ovates and segmental choppers were rare across both size classes, but the former two types were almost absent among the giants. Interestingly, cleavers occurred in similar proportions regardless of handaxe length.

7.5.4. Giant handaxe symmetry.

A more general discussion of symmetry in MIS 9 handaxes is undertaken in the following section, but it is worth considering the symmetry of larger *versus* smaller handaxes in isolation.

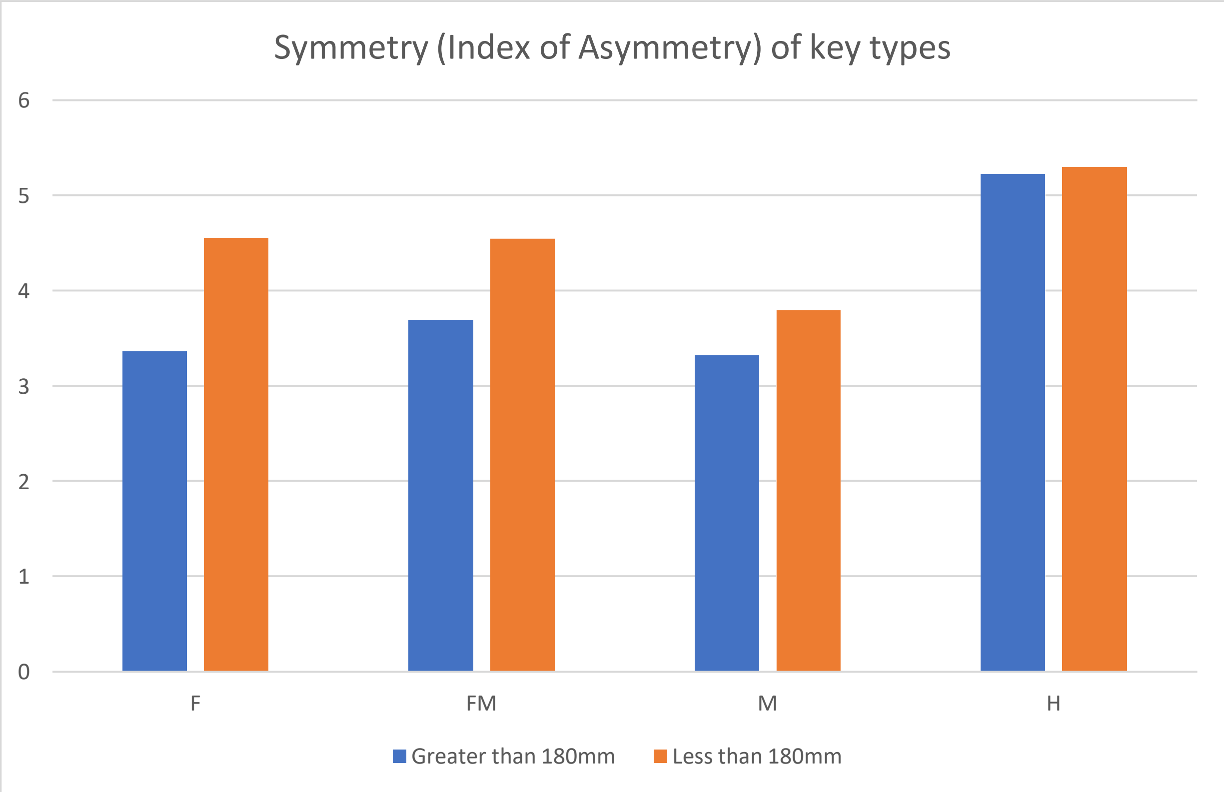


Figure 7.20. A comparison of average symmetry between larger (L<180mm) and smaller (L>180mm) examples of key types, which were found to frequently occur as 'giants'. The higher the Index of Asymmetry, the less symmetrical the object. This graph shows that type F, FM and M handaxes were on average more symmetrical when 'giant' than when sub-180mm. Cleavers were closely similar in both size classes.

Taking the key types of interest (types F, FM, M and H), the differences in average symmetry between larger and smaller handaxes can be compared (figure 7.20). The results show that all types have lower IOA values (i.e., are more symmetrical) in 'giant' forms. Ficrons were generally more symmetrical than other types across all size classes, but again were more symmetrical when greater than 180mm. There was little difference between the symmetry of cleavers based on size, which were less symmetrical on average than pointed types and ficrons.

7.5.5. Broken handaxes.

Broken handaxes were also recorded as part of this study but were removed from the metrical analyses. Type could often still be gauged from the remining handaxe fragments; ficrons and demi-ficrons (M, FM) were more than twice as common in the broken handaxes (16.05% of the sample) than in the unbroken handaxes (7.24% of the sample). These were occasionally represented by discoidal butt remnants, but more commonly by refined, elongate tip fragments. At least three, and probably more, of the broken ficrons would have exceeded 180mm in length had they been complete. In addition, MacRae (1987) mentioned a butt fragment from Keswick which may have qualified as one of the largest British handaxes had it been whole. These data suggest that 'giants' (particularly giant ficrons) were more susceptible to breakage. This has previously been suggested as a weakness inherent in highly elongated handaxes, which may experience destructive flexion and vibration during use (Whittaker 1994). Presumably, they would be susceptible to post-discard breakage for the same reason. Giant ficrons may therefore have been more common than current collections suggest.

7.5.6. Giant handaxes discussion.

The examination of 'giants' is not simply a curiosity; giant handaxes, and particularly the Furze Platt and Cuxton Giants, have featured prominently in almost every major post-processual study of British handaxes. To Kohn & Mithen (1999) the Furze Platt and Shrub Hill Giants were 'oddities' which nevertheless defied functional explanation, being 'much too unwieldy for use' (Wymer 1968; Roe 1981). They used this perceived lack of functionality to suggest a social function for the handaxe in displaying sexual fitness. Similarly, Spikins (2012) considered the mass and size of the Furze Platt Giant to go 'well beyond the functional', which she used to suggest that handaxes had a role in projecting trustworthiness (thereby allowing greater social cohesion). White & Foulds (2018) noted the extremely high symmetry of the Furze Platt giant, which they used as evidence to suggest that symmetry was imposed where possible, even in assemblages where symmetry was quite variably applied such as Furze Platt. Hodgson (2015) highlighted the apparently 'over-engineered' nature of the giant handaxes as evidence for increased cognitive development.

The last point is interesting, if the suggestion that giant handaxes were indeed more commonplace in later (particularly MIS 9) assemblages is correct. Increased cognitive development over time would be consistent with the increased frequency of giant handaxes immediately preceding the cognitive and behavioural threshold of the Lower – Middle Palaeolithic transition. In response to this suggestion, McNabb & Cole (2015) suggested that, whilst giant handaxes do appear to be too large to have been functional, and perhaps did carry additional social 'weight', their place within the spectrum of Acheulean society is not clear and their use as devices of social mediation is less clear still. This equivocal position is echoed by the current author, with the addendum that even a giant handaxe may have had a 'function' in the physical sense. Jones (1980) conducted experimental studies, concluding that large tools (150 – 200mm length) were more efficient than small flakes, particularly in heavy-duty butchery tasks. Conversely, Tumler et al. (2017) found that participants in their own experimental study preferred smaller handaxes (a preference which was particularly pronounced in female participants). The experimental evidence is certainly not sufficient to dismiss a practical function for 'giant' handaxes outright; the fact that larger tools heavily favoured pointed and ficron forms might argue that they were produced for some specific function which demanded a large and heavy tool, although what that function may have been is unclear. A giant handaxe may have been unwieldy to lift one handed for one individual but could easily have been held two handed or cooperatively between two individuals. Alternatively, Foulds et al., (2017) suggested that giant handaxes might have been static tools, rested on the ground with the animal carcass pressed down onto the upward facing edge. They cite examples of large handaxes from Isimila, Elandsfontein and Doornlaagte which were found embedded on one edge when excavated (Wymer 1982), although this would be hard to imagine for the biconcave – and fragile - ficrons. These questions will no doubt require further experimental work to elucidate.

The description of the Cuxton Giant handaxe as 'flamboyant' (Wenban-Smith 2004) - a description which has caught the imagination of other researchers and has been widely requoted (e.g., Currie 2009; Pettitt & White 2012; Hodgson 2015; White & Foulds 2018) - is apt. Wynn & Gowlett (2018) suggested that preferred handaxe form underwent a peak-shift, where larger and more extravagant forms were more valued as a form of expression and for their aesthetic qualities. For them, the trend towards increased complexity in handaxes culminated,

"*…by half-a-million years ago… in spectacular hypertropic forms such as extreme ficrons and twisted ovates, as well as giants…*".

It occurs to the present author that the twisted ovate is not hypertrophic, nor immediately spectacular – twisted profiles are certainly visually striking to the modern eye, but the key design feature can only be seen edge-on and held close to the observer. It must be held to be appreciated; it is no more visible from a distance, especially lying flat, than any other handaxe type. The evidence presented here also suggests that the most 'extreme ficrons' were often *also* giants, or at least tended towards large size. The present author therefore suggests that the truly 'spectacular hypertrophy' only really came about as a recurring part of the lithic repertoire in MIS 9 and is thus a chronologically restricted occurrence. The two pre-Anglian giants on MacRae's (1987) list only weaken this argument slightly, as they constitute a small fraction of the known 'giants' (although it is acknowledged that this may well be expanded through more intensive studies of non-MIS 9 material). The Shrub Hill Giant was considered to be 'skilfully flaked' by Wymer (1985), but is relatively asymmetrical (quite unlike, for example, the Cuxton Giant or the largest of the Wolvercote plano-convex handaxes). It must also be acknowledged that the degree to which this apparent pattern extends into Europe is unclear; at least one example of a true 'giant' (330mm L, shown below in figure 7.21.) of potentially extreme antiquity was found in Level P at the cave site Caune de l'Arago, southern France (Barksy & de Lumley 2010; Barsky 2013; Moncel & Ashton 2018). This layer was dated by a combination of climatic correlations and radiometric methods to 570ka (MIS 14), albeit with a relatively high degree of uncertainty (Barsky & de Lumley 2010). Barsky (2013) considered the Level P handaxe assemblage to be 'a rare example of how innovative Mode 2 techno-typological features and associated behaviours took root in western Europe around 0.7–0.6' Ma.

Figure 7.21. A giant ficron handaxe (L=330mm) made on schist from Level P at Caune de l'Arago, France. Figure reproduced from Moncel & Ashton (2018), Fig. 11.3, p. 218; after Barsky & de Lumley (2010).

The extremely high levels of symmetry in giant ficrons may be interpreted as evidence of additional value being placed on giant handaxes beyond the strictly functional– they were not just bigger, but also better in terms of the attention paid to their manufacture. Emery (2010) noted through cursory examination of 'paired' handaxes that such examples also tended to be larger (>150mm). 'Paired' handaxes share visibly similar morphological characteristics and were discarded close together (Ashton & White 2003; White & Plunkett 2004; Pope et al., 2006; White & Foulds 2018). Ashton & White (2003) had suggested that three examples of near-identical handaxes from Foxhall Road, found close to each other, represented the stylistic 'signature' of a single knapper. Similar suggestions were made of the large plano-convex handaxes from Wolvercote (Tyldesley 1986). This may well be more generally true of 'giant' handaxes, although it is unclear who such 'signatures' were intended for – perhaps the knapper produced a spectacular handaxe for the sheer enjoyment of producing a fine implement (White & Foulds 2018), or perhaps the individual 'signature' was distinctive enough that it could be recognised as such by others. This latter idea may be linked to the suggestion of Pope et al. (2006) that handaxes had stigmergic qualities (that is, that the evidence of previous occupation could be used as a cue to subsequent occupations). The crucial point Pope and colleagues made was that the structured discard of handaxes would have been visible to other individuals and groups at a later time, imbuing them with semiotic properties constituting a 'release from proximity'. Pope and colleagues had envisioned this process (either active or passive) as a means by which single-occupation scatter of symmetrical, well-made handaxes left in the environment might signal 'game intercept opportunities, fresh water or other resources process' to subsequent groups, who may have been unfamiliar with the local environment. They extended their argument to suggest that structured artefact scatters may have acted as a semiotic precursor to language.

Whatever possible function or significance giant handaxes may have had, they were clearly not designed as easily portable objects (Foulds et al., 2017). As such, any social significance must have either occurred at the point they were made – this would be necessary if the knapper was to be associated personally with the object, and presumably a requisite for interpersonal or social explanations of 'giant' handaxes (e.g., Gamble 1999; Kohn & Mithen 1999; Spikins 2012) – or through their discard in the environment, where the 'meaning' of the handaxe would be independent of the physical presence of the knapper. The latter explanation is favoured here. The size, and 'flamboyance' of these handaxes would have made them highly visible when discarded – the smaller handaxes which probably formed the bulk of MIS 9 assemblages may have been more easily obscured, for example by sediment deposition or vegetation growth. Stone tools would have constituted the only permanent or semi-permanent evidence of occupation and would be highly effective 'signposts', whether for game, water and resources as Pope et al., (2006) suggest, or as territorial markers. They could have fulfilled this function even if hominin visits to the area were very infrequent, as the evidence of occupation could potentially have remained visible for many years. This does not, of course, necessarily preclude any of the other suggestions for the meaning of 'giant' handaxes also being true. A knapper could conceivably have made a 'giant' handaxe, taken pleasure in doing so (White & Foulds 2018), shown it to another individual as a proxy for patience and trustworthiness (Spikins 2012), and then strategically deposited it in the environment to mark a productive game trail (Pope et al., 2006). Handaxes were versatile physical tools- there is no reason to doubt they had versatile social roles also.

7.6. Interpreting chronological patterning through the lens of palaeogeography, colonisation and demographic factors.

Sub-stage chronological patterning in handaxe form in the MIS 11 interglacial has been ascribed to influxes of new populations during periods of low relative sea-level (White et al. 2019; Shipton & White 2020). Likewise, the appearance of the Clactonian at the beginning of MIS 11 and MIS 9 has been ascribed to colonising non-handaxe groups, which may have originated in central Europe (White & Schreve 2000). Waves of colonisation may explain the suggested sub-MIS chronological variation in MIS 9.

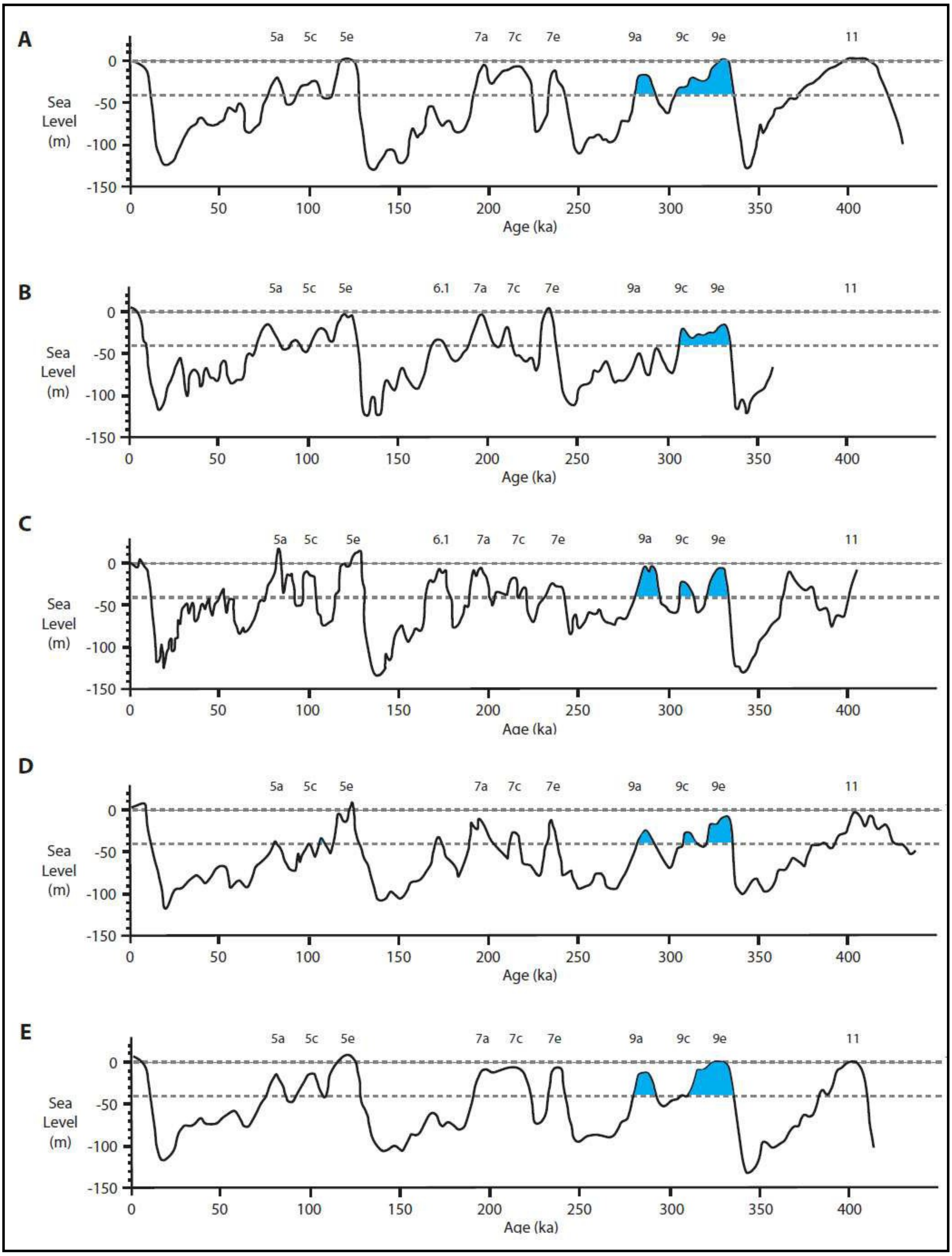


Figure 7.22. Models of insularity and peninsularity in the British Quaternary, from White & Bridgland (2018), Fig. 2. The five curves were generated from data in (A) Waelbroek et al., (2002), (B) Lea et al., (2002), (C) Shackleton (2000), (D) Siddall et al., (2013) and (E) Cutler et al., (2003).

Figure 7.22 shows sea-level curves generated from a range of isotopic proxies. The upper line shows modern sea-level (0m); the lower, dashed line shows 40m below modern sea-level, the approximate regression needed to reconnect Britain to the European mainland in MIS 9 by a North Sea land bridge, which would allow new colonising groups to enter. The models agree that each successive warm peak was more isotopically depleted in 18O, indicating a climate which deteriorated gradually before the MIS 8 glacial began. This phenomenon is also seen in MIS 11 and MIS 5, where the marine isotope record is supported by palynological and faunal evidence of progressive cooling (Shackleton, 1969). There is widespread agreement that MIS 9e was the warmest part of the interglacial (see above; Antoine et al., 2021). The potentially recurrent isolation and reopening of Britain led White et al. (2018) to hypothesise that the different lithic industries of MIS 9 could be linked to new influxes of hominins from Europe, at times when the land-link was re-established during cooler substages. Any one of models A – E could allow the archaeologically observed succession of industries in MIS 9. All five show a period of peninsularity at the MIS 10 – 9 transition, allowing an influx of Clactonian groups. The probable early appearance of the Acheulean in MIS 9 (at, for example, Stoke Newington) might suggest that the colonising group arrived during the same phase of peninsularity as the Clactonian group. Likewise, any of the models would permit the ingress of a Levallois group at the MIS 9c – 9d transition, or at the MIS 9 – 8 transition (e.g., Westaway et al., 2006; Bridgland et al., 2006). The lack of a robust chronological framework for MI sub-stages makes it difficult to suggest whether distinct groups of handaxe makers arrived in Britain in MIS 9 (i.e., Group IA and IB cultures); each of the models permits population replenishment during periods of insularity following the MIS 9e peak, although the *in situ* development of the later IA sub-group from the earlier IB sub-group is just as likely (discussed below).

Despite advances in MI records, the terrestrial evidence for insularity in MIS 9 is much weaker, and difficult to correlate with specific sub-stages. At Greenlands Pit, Purfleet, the laminated grey clay at 14m OD (Bed 4 in Schreve et al. 2002) is attributed to an intertidal depositional environment (Hollin, 1977; Schreve et al. 2002). The presence of obligate freshwater ostracods (*Cytherissa lacustris*) higher in the temperate Purfleet Member suggests that the local salinity changed over time, and that saline input 'may have been sporadic and pulsed, and probably continued… throughout the sequence' (Schreve et al. 2002). Salt-water influence at Purfleet is indicative of relatively high sea levels, given how far the site is up the modern estuary. Whilst this information is important to understanding the site and strengthens correlation with the warm peak of MIS 9e, it is not especially useful in reconstructing the island-history of Britain given that all five of the marine isotope models shown above agree that Britain was an island in MIS 9e. The other key MIS 9 environmental sites in the Lower Thames – Barling, Shoeburyness and Cudmore Grove – also show evidence of elevated salinity and are also correlated with MIS 9e (Roe et al., 2011). The Nar Valley clays of Norfolk also record a marine influence (Ventris 1996): no substage attribution is attempted for the clays, although a coarse attribution to MIS 9 is reasonably secure based on Uranium Series dates of 317±14 ky. (Rowe et al., 1997). That being the case, it is possible that the high sea levels indicated by the Nar Valley Clay may also represent substage MIS 9e and cannot at present be used to resolve the different sea-level models shown above.

7.6.1. Possible European sources.

Britain was first recolonised after the Anglian glaciation (MIS 12) by Clactonian populations from Europe who did not habitually make handaxes; the same pattern appears to repeat at the MIS 10/9 transition (White 2000; Rawlinson 2021). The source populations for the Clactonian have never been satisfactorily identified, but possibly derived from areas of central Europe where handaxes are rare or absent (White & Schreve 2000; Ashton 2018). White et al. (2019) suggested that new lithic traditions emerged during periods of climatic instability, perhaps displacing declining or extirpated resident populations. In support of this, they pointed to the endurance of the MIS 11 Clactonian through the early to fully temperate phases of the interglacial (pollen zones HoI and HoII) before its replacement by Acheulean technology following a pronounced fluctuation in climate (indicated by widespread deforestation across Europe, and perhaps caused by volcanic activity or a bolide impact) (Nitychoruk et al. 2005; Ashton et al., 2008; Candy et al. 2014; Ashton 2018). Whether climatic and environmental fluctuations can account for the changes in lithic technology in MIS 9 is hard to measure. The interglacial was short compared to MIS 11: the record is compressed and (as already lamented) generally deficient in the kind of fine-grained, long-duration sedimentary record which has allowed such environmental reconstruction in MIS 11. It should also be considered that handaxes appeared early in MIS 9, at least by MIS 9e (based on Stoke Newington, Green et al. 2004, 2006) and probably earlier given the occurrence of handaxes in the Phase 2 gravels in north London. From this evidence, it certainly appears that the handaxe makers arrived at around the same time as the core-and-flake makers, assuming they did indeed represent different populations (this is discussed fully below).

In terms of specific handaxe morphological preferences, archaeology may again be used to suggest colonist ‘source’ areas, where there is similarity to the archaeology of the British ‘sink’ (Dennell et al., 2011). The most obvious place to look for such populations is the north of France; not only is this the most likely colonisation route, but there is a relative lack of MIS 9 Acheulean sites in the west of France compared to the east (Herisson et al., 2016; Connet et al., 2020). Shipton & White (2020) saw parallels between the typologically diverse Broom assemblage and the MIS 10 – 9 sites of the

Somme, France (Gentelles, Revelles, Cagny l'Epinette and Ferme de l'Epinette) (Tuffreau et al. 2001, 2008; Lamotte & Tuffreau 2016). The diverse cobble tools found at the MIS 9 – 7 site in layers 4 and 5 at Menez-Dregan I, Brittany, France might also be viewed as a 'cousin' of the Broom assemblage, featuring fan-shaped cleavers, narrow points and ovates (Ravon et al. 2016a, 2016b). That said, it should be acknowledged that there is a risk that any site with a diverse array of types could be presented to appear 'generalised' through the selective illustration of fine or unusual examples (a problem highlighted by White & Foulds 2018). Etricourt- Manancourt, also situated on the Somme and dated to MIS 9a, has at least one well-made, narrow ficron along with an irregular handaxe reminiscent of Cuxton, and may be related to the British Group IA culture; there are even intriguing hints of a tripartite succession (Clactonian, Acheulean, Levallois) at this site, as shown in figure 7.23 (Herisson et al. 2016).

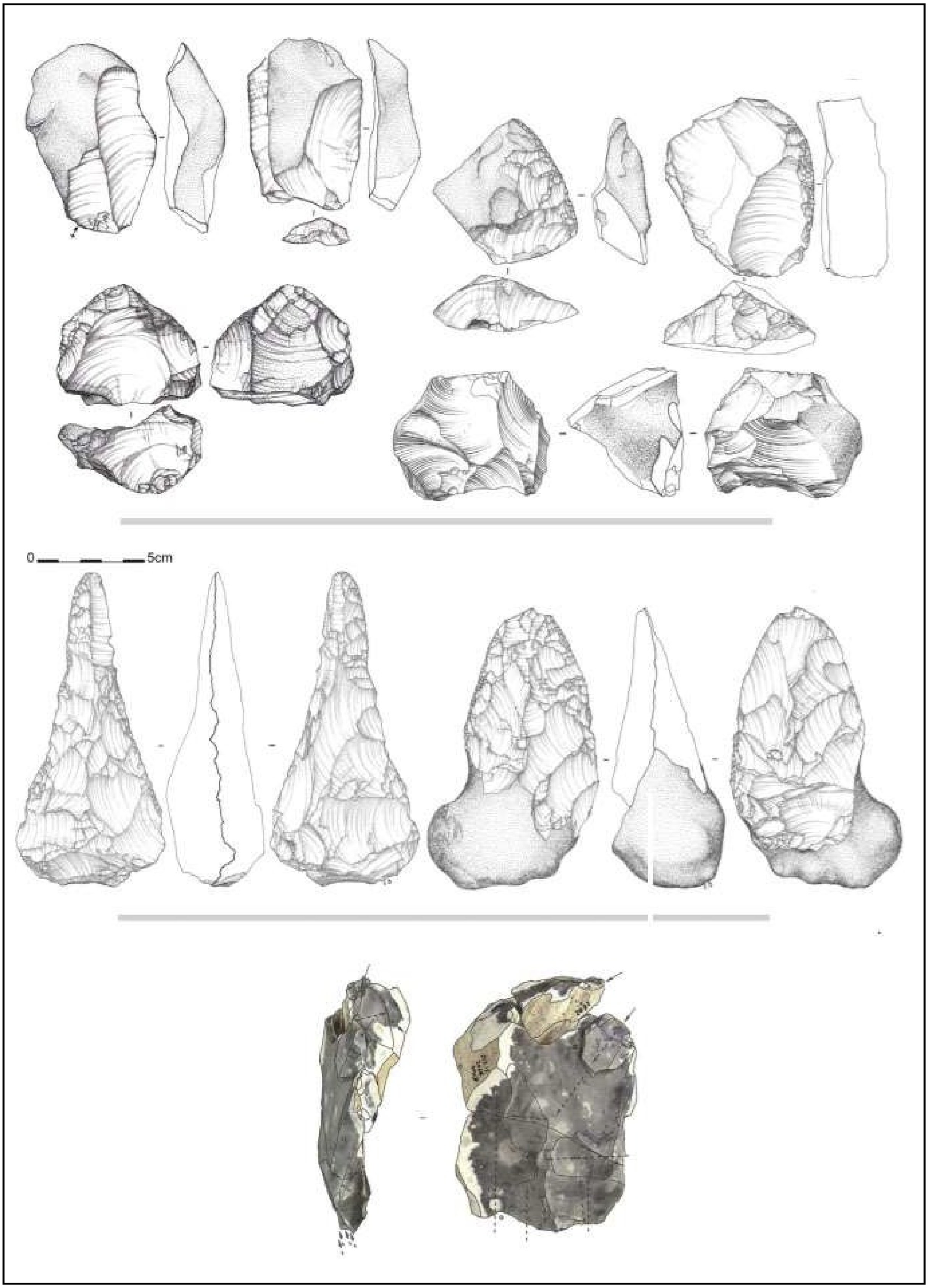


Figure 7.23. A tripartite succession of lithic technologies from Etricourt-Manancourt, a clear parallel to the British record at Purfleet. Although only two handaxes are figured, both are reminiscent of the finer examples from Group I sites in Britain. The figure shows Clactonian artefacts (top), handaxes (middle) and proto-Levallois (lower). Figure after Herisson et al., (2016).

The site at Saint-Pierre-lès-Elbeuf, France produced an Acheulean assemblage from a cool-climate palaeosol, dated to MIS 10 based on the U/Th dating of an underlying tufa deposit (Lautridou & Verron 1970; Cliquet et al., 2006, 2009). Handaxes from this site are shown below in figure 7.24; the large cleaver and narrow points and ficrons are all clearly reminiscent of British Group I assemblages.

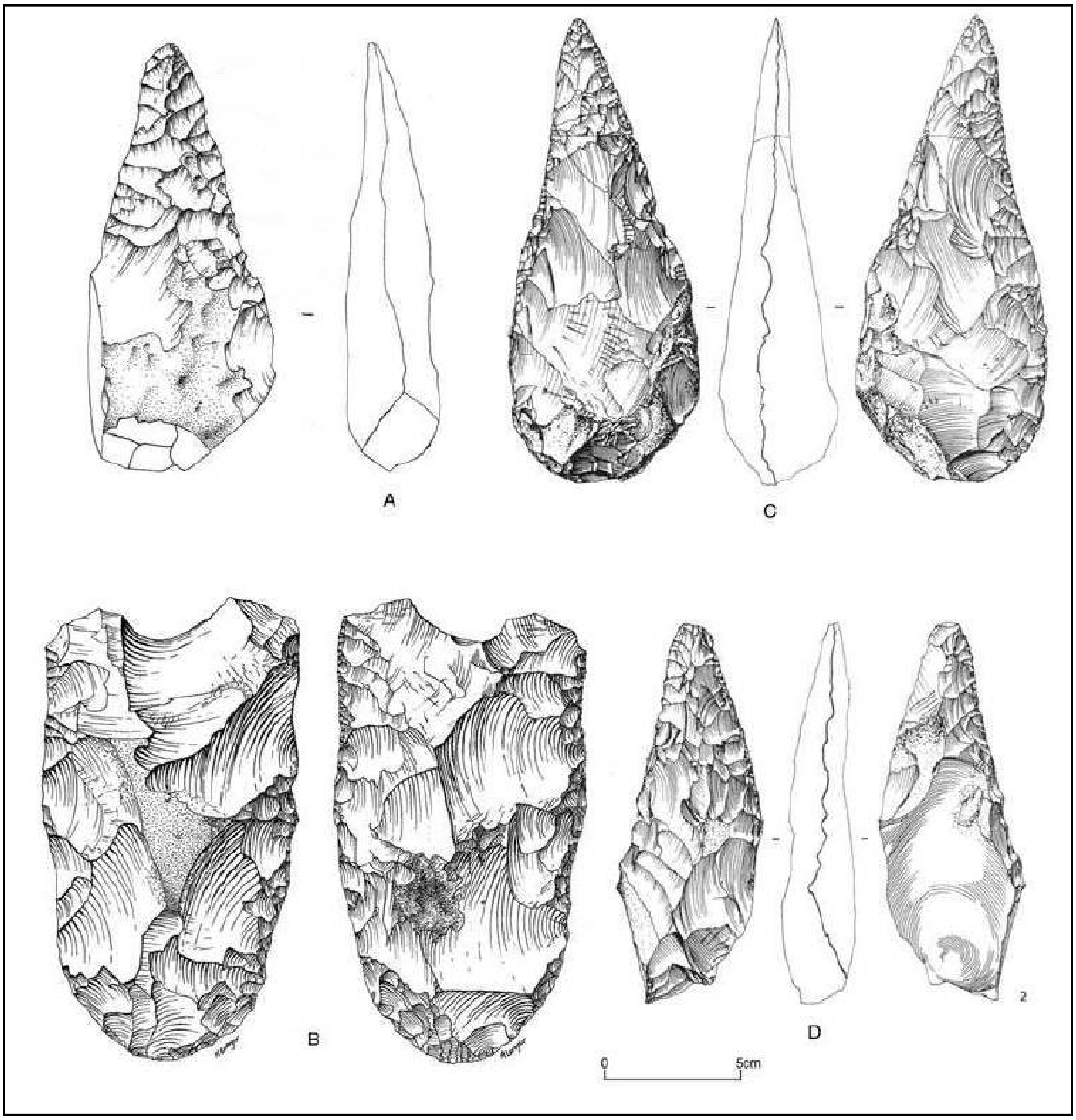


Figure 7.24. Handaxes from Saint-Pierre-lès-Elbeuf, showing types typical of British Group I assemblages in including 'marginal' ficrons (type FM; A, C), a large cleaver (type H, B) and an asymmetrical elongate point (type F, D). Note also the oblique removal from the butt of handaxe A. Figure from Cliquet & Lautridou (2009); A and B originally figured in Leroyer (2005); C and D originally figured in Delagnes & Ropars (1996))

The picture at Plachy-Buyon is less clear, with figured examples showing small, crude and unrefined handaxes not dissimilar to some of the sites in this study, along with what appears to be a broken ficron tip (Locht et al., 1995); the descriptions of the handaxes in this case are not enough to clearly suggest British parallels, however. Nor does the site at Revelles, which may contain a distinct fresh and derived series, offer much hope of providing a robust typological analogue with Group I, although the fresher series includes both cleavers and 'lanceolates' (possibly ficrons) and the more rolled series '*bifaces à dos'* (i.e., backed bifaces) and 'Micoquian' handaxes, none of which would look out of place in a typical British Group I assemblage (Lamotte et al., 2019). The tantalising similarities between some of the north-eastern French sites and the British Group I do not extend to the MIS 9 site at Soucy 3, where a large handaxe assemblage (n=276) showed a distinct preference for 'ovate morphotypes' (Chausse 2003; Lhomme 2007). This can be seen clearly in the selection of handaxes illustrated below in figure 7.25. That said, it is interesting to note that Lhomme (2007) identified a sub-set of the Soucy handaxes which featured an 'active' part towards the tip and a 'gripping' part towards the butt, a prehensile feature discussed fully below.

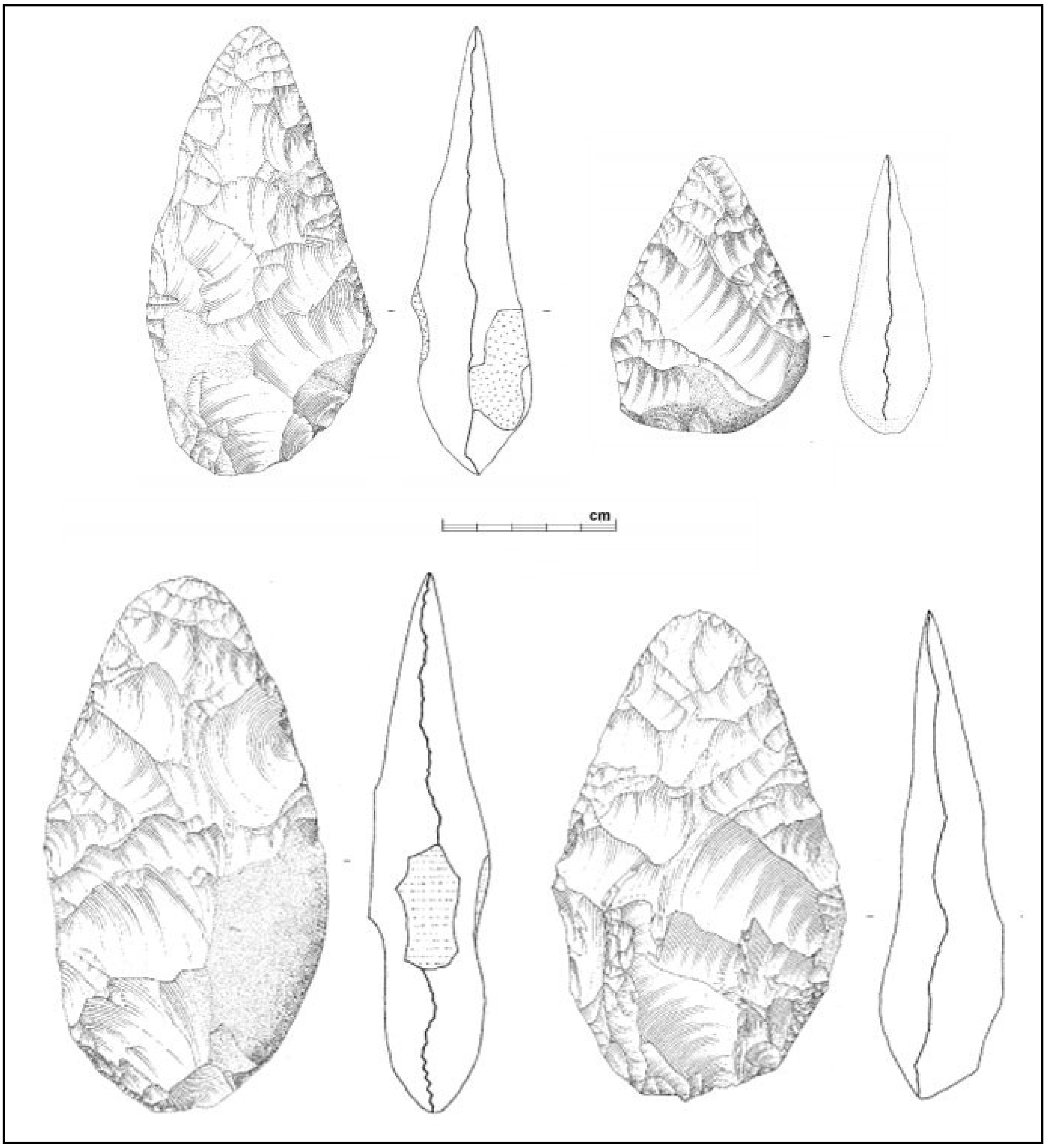


Figure 7.25. Four handaxes from Soucy, France. Whilst the large handaxe assemblage included some broad pointed forms (top row), it was dominated by ovate-cordate morphologies (lower row). After Lhomme (2007).

There is, then, evidence of complexity in the proximal European record, supporting Ashton & Davis' (2021) 'Cultural Mosaic Model', including ovate dominated assemblages which are rare in the British MIS 9 record. The French sites which appear to show some of the same distinctive characteristics as the British (Group I) sites are summarised below in table 7.11.

Table 7.11. MIS 9 sites in the proximal parts of France which may relate to the British sites in the present study, based on their handaxe shape preferences (selected sites discussed in text) and the occurrence of Levallois.

Site	Region	Age	Levallois?	Dating reference.	General reference.
Cagny L'Epinette	N France	Early MIS 9	No	Bahain et al., (2007).	Tuffreau et al., (2008)
Gentelles	N France	MIS 9	Yes	Tuffreau et al., (2001).	Tuffreau et al., (2001).
Etricourt – Manancourt Unit 12 (layer HUD)	N France	MIS 9c / 9a	Yes – hints of a tripartite sequence.	Herisson & Goval (2013); Herisson et al., (2016).	Herisson & Goval (2013); Herisson et al., (2016).
Soucy 3 (Level P)	N France	9e	No	Chausse (2003).	Chausse (2003); Lhomme (2007).
Plachy-Buyon	N France	9	No	Locht et al., (1995); Herisson et al., (2016).	Locht et al., (1995).
Revelles	N France	9	Rare, and poorly attested.	Debenham, unpublished in Herisson et al., (2016).	Guerlin et al., (2008); Lamotte et al., (2019).
Orgnac layer 3-6	SE France	9 - 8	Yes	Moncel et al., (2011).	Moncel et al., (2011).
La Micoque	SW/ S Central France	9	Yes	Falguères et al., (1997)	Mathias et al., (2020)

Without full metrical and typological analysis, attempts to identify source populations in Europe *for specific handaxe groups* (particularly those as subtly different as the putative sub-groups IA and IB, or even Group I and II) border on simple speculation. Metrical analysis of the northern French sites and British sites using compatible measurements should therefore be a future research priority, as advocated by the Western European Acheulean Project (Garcia-Medrano 2020a, 2020b).

Ashton et al. (2015) suggested that the easiest colonisation routes into Britain would have been across the southern North Sea basin, originating from the Rhine or Scheldt and joining the Thames Valley. The colonisation of the Solent is more problematic; Ashton and colleagues suggested either a difficult Channel crossing, migration into the region from the Middle and Upper Thames (via the Kennet), or westward migration from the southern North Sea basin via an unidentified (and probably now submerged) coastal route. The distinctive 'generalised' Broom and Highfield handaxe assemblages which are absent from the Thames sequence might argue against colonisation via the Thames Valley, although this would be a good explanation for the more typical Group I material at sites such as Warsash. A coastal migration of the 'generalised' culture could certainly explain the general lack of highly generalised sites in the east, as any coastal site would now be flooded. This could also be consistent with the typological diversity of some of the MIS 9 Somme sites, although this link will remain tenuous until a comparable morphometric and typological analysis can be undertaken for proximal European assemblages. This line of enquiry is confused further by the other putative Group IV sites in the Solent, which appear generalised but are very likely to have produced vertically mixed assemblages.

The palaeogeography of the lower sea-level phases of MIS 9 may have allowed colonisation further north, from the Low Countries into East Anglia. The presence of Levallois flakes dredged from Area 240, some 11km offshore from eastern Norfolk, confirms a human presence on the low-lying plains which became the southern North Sea (Tizzard et al., 2014, 2015), although the MIS 9 age attribution of these finds may be challenged on the grounds of the insecure provenance, and the character of the handaxe assemblage which is dominated by refined cordiform types. In any case, it is perhaps more likely that the Area 240 artefacts represent an expansion *out* of Britain rather than *into* it: the rivers which flow to the north and east of the possible drainage diversion across the Channel (the remnants of the Weald-Artois anticline) appear to be devoid of comparable archaeological assemblages. The river Meuse, for example, has only a single pre-MIS 8 archaeological site at La Belle-Roche, Belgium (Tuffreau & Antoine 1995), and even there the man-made credentials of the 'artefacts' have been challenged (Roebroeks & Stapert 1986). Neither has the Rhine produced significant handaxe assemblages (White 2000).

Alternative explanations for handaxe variability.

Rather than looking to Europe for analogues to the British record, it may be suggested that the progression from smaller handaxes in the early part of the interglacial to larger handaxes later in the interglacial occurred in isolation without new population influxes. This might explain the similarities between sub-group IA and sub-group IB in terms of their shared typological preferences (including ficrons and cleavers) and morphometrics (in terms of planform and tip-shape), all of which resemble Roe's original Group I. The autochthonous development of sub-group IA from sub-group IB can be supported by considering the engagement between cultural tradition and landscape. Ashton (2018) suggested that the stable environmental conditions provided by interglacial periods would have allowed hominin groups to persist in their environments over many generations. This would have allowed technological cultural practises – which may have been 'imported' from source populations in some form, or come about in response to local exigency, spontaneous idiosyncratic design, or even resulted from stochastic 'drift' - to become established in social traditions. As White et al.

(2019) suggested, landscapes of habit (Gamble 1999) could become ‘landscapes of cultural tradition’.

There are several possibilities as to why handaxe size and elongation may have increased from the beginning to the end of MIS 9 within such an established ‘landscape of cultural tradition’, relating to changes in the climate and environment.

1. *Environmental tracking*.
   The idea of environmental changes impacting tool size echoes an idea advanced by Barnes (1930), who observed cyclic changes in handaxe size at the site of Le Moustier, France. Barnes, one of the first researchers to employ metrical and statistical methods to the Palaeolithic, noted five cycles of changes in the median size of handaxes spanning the late Lower Palaeolithic and Middle Palaeolithic. Barnes’ interpretation of these cycles was explicitly environmentally deterministic, although he was unable to suggest why climate might impact artefact size. Corbey et al., (2016), in their contentious advocacy of a genetic basis for handaxe production, suggested that the absence of environmental tracking in the handaxe record argued against the cultural transmission of technical information. They pointed to models produced by Boyd & Richerson (1985, 1996), which suggested that the cultural transmission of behavioural patterns should be the dominant mode of transmission in moderately variable environmental conditions. In contrast, rapidly changing environments should have favoured individual learning over either cultural or genetic transmission, and slowly changing environments should have favoured genetic transmission over either cultural transmission or individual learning. They further suggested that behaviours associated with cultural transmission should ‘track’ environmental changes, whereas genetic transmission or individual learning would not. Corbey et al., (2016) highlighted the perceived (but disputed) conservativism of the Acheulean to show that such environmental tracking did not occur in handaxes, which appeared broadly similar across a huge range of environments and climatic conditions. They used this to suggest that the handaxe was not a culturally transmitted phenomenon. This suggestion was strongly rebuffed by Hosfield et al., (2018) and McNabb (2020), who suggested that as a generic and multi-purpose tool, environmental tracking might not even be expected; experimental studies (e.g., by Walker & Lee 2016), showed that handaxes were produced to basic functional requirements (primarily the support of an edge on a hand-held tool) which would not necessarily have tracked environmental changes even if other, archaeologically invisible behaviours such as hunting practises *were* affected by climatic variability.

Despite this, Hosfield et al., (2018) highlighted possible examples of environmental tracking in the British archaeological record, including changes in preferred shape between the Lower Middle Gravel (temperate), Upper Middle Gravel (cooling) and Upper Loam (temperate) at Swanscombe (Conway et al., 1996), and the Hoxne Upper (warm, cooling) and Lower (warm) Industries (Singer et al., 1993; Ashton et al., 2008). However, these changes were suggested to reflect cultural rather than environmental changes, based on the extirpation and recolonisation of each site by new cultural groups (e.g., Bridgland & White 2014, 2015; White et al., 2019), and so cannot be strongly linked with environmental variability. Analysis of the long (c. 1My.) archaeological and environmental sequence at Atapuerca, Spain found no evidence of cultural changes in response to changing climates, although it was accepted that more data was needed from other comparable long sequences to determine if this was simply a local phenomenon (Rodriguez et al., 2011). The evidence from Atapuerca was also looking at changes in techno-complex, rather than variability within handaxe morphology, and so is not directly comparable to the present study.

The role changing climatic conditions may have played in influencing handaxe dimensions and morphology is unclear, if it occurred at all. There is scant environmental evidence which may be linked to either sub-group IA or sub-group IB, except that the latter may have occurred around MIS 9e in the warmest part of the interglacial, and the former may have occurred later in the interglacial (likely cooler than MIS 9e but consisting of at least two warm peaks and two cool troughs). The ecological paradigm known as ‘Bergmann’s Rule’ states that the body-mass of ectothermic birds and mammals can be inversely correlated with temperature (i.e., cooler temperatures result in greater body mass) (Bergmann 1848). This includes variation within species, and in the relative representation of small and large species within an environment (Mayr 1956; Freckleton et al. 2003). Tool size may therefore be related to the size of carcass commonly being processed; smaller handaxes for smaller game in earlier fully interglacial conditions, larger handaxes for larger game in cooler post-temperate and glacial conditions. The idea of larger handaxes being ‘heavy duty’ has been approached obliquely by several researchers (e.g., Cranshaw 1983; Machin et al. 2005), but rarely explicitly linked to the size of the carcasses they were used on. Bringmans et al. (2004) identified ‘bigger cores, flakes and tools’ in cooler periods at the multi-period Middle Palaeolithic site of Veldwezelt-Hezerwater, Belgium, which they linked to Bergmann’s Rule. Bringmans and colleagues suggested that contextual considerations (particularly climate and raw material constraints) overrode cultural factors; here, the opposite is suggested; size variation appears to occur only within culturally defined parameters. This can be shown by the occurrence of ficrons and cleavers across almost every site in this study, regardless of the variable average length and elongation of the assemblage. That said, a recent experimental study by Baber & Janulis (2021) has suggested that handaxes may have been produced with heavy duty (i.e., chopping, smashing activities to access bone marrow) or light-duty (i.e., cutting, butchering) tasks in mind; they explicitly linked the mass of the tool to its suitability for each task, noting that the more massive handaxe used in their study was far superior at heavy duty tasks owing to the greater transference of energy the greater mass allowed. This experimental work does not map perfectly onto the data shown in the present study; whilst larger and massive handaxes do appear to have been a more common feature in MIS 9 than in earlier interglacials, and potentially more common later rather than earlier within MIS 9, they were not typically crude objects – in fact, giants appear to have been *more* symmetrical and well-made on average than smaller handaxes (see above). Burdukiewicz (2000) linked the occurrence of backed bifaces to cooling climatic conditions in eastern Europe; ergonomic features approaching backing are discussed below, but it is unclear whether they relate more to warm or cool climate conditions. More experimental work would shed much needed light on the possible differences in functionality between smaller and larger handaxes, which could in turn add weight to – or cast doubt on – the idea of environmental tracking in MIS 9 handaxes.

2. *Organic material culture*.

Wooden spears are a rare but well attributed part of the late Lower Palaeolithic toolkit, evidenced by the MIS 11 Clacton Spear (Alllington-Jones 2015), and the MIS 9 spears found at Schöningen, Germany (Thieme 1997; Schoch et al., 2015). Bone tools are also a rare but widespread phenomenon, with bone handaxes being found individually or in very small numbers across the Acheulean world (e.g., Anzidei et al., 2001; Wei et al., 2017; Sano et al., 2020) and as the dominant material of the sizable handaxe assemblage (consisting of as many as 99 bone tools) from Castel di Guido, Italy (Anzidei et al., 2001; Zutovski & Barkai 2015). The absence of these organic tools from the MIS 9 British record is almost certainly a matter of poor preservation; the widespread existence of these tools elsewhere and in earlier British interglacials strongly suggests they were part of the MIS 9 British toolkit. It is unclear whether these organic implements carried the same cultural 'meaning' which has been suggested for the (lithic) handaxe – it is possible that the cultural meaning of the handaxe may have been less important earlier in the interglacial, perhaps as a result of the relatively greater abundance of organic raw materials available to produce wooden or bone objects (Bringmans et al. 2004). It has even been suggested that, by manufacturing skeuomorphic bone handaxes using the remains of megafaunal prey animals, the hominin makers were expressing an early worldview or spiritual conception (Barkai 2020). This relatively greater importance of organic tools to material culture in the earlier part of the interglacial may explain the absence of standard handaxes in the Clactonian colonisation of Britain in the pre-temperate to temperate phases of the interglacial (M. White *pers. comm*. 25.01.2020).

3. *Territory size and mobility patterns*.
   Warmer temperatures would allow hominin groups (150 – 200 individuals) to occupy smaller ranges, due to the greater energetic resource available in temperate environments (Kelly 1995; Roebroeks 2001; Ashton & Davis 2021). The need for social cohesion to be mediated through material culture would presumably be lessened where territories were smaller and contact between group members was more frequent and direct. Conversely the cooler, later stages of the interglacial might necessitate much larger ranges, reducing direct contact with others and placing a greater emphasis on shared material culture as a means of social cohesion. Pearce (2014) modelled hunter-gatherer behaviour using a 'gas model' which assumed random movement of individuals within an environment, using this model to test whether simple 'face-to-face' contacts between individuals would be sufficient to maintain a viable, cohesive social network. She found that even random movement would ensure sufficient contacts in low-latitude environments, where high resource density would support relatively small, densely populated ranges. In contrast, high-latitude environments (with concomitantly low resource density and dispersed populations) would not support socially cohesive populations through random contacts alone (Pearce 2014). The implication of this modelling is that higher latitude hunter-gatherer groups would require a 'cultural scaffolding of social network maintenance' in lieu of frequent face-to-face contacts. This would likely manifest as an increased reliance on material culture. The differences in territory size might also be considered in terms of inter- and intra- group familiarity; there was potentially less need to 'signal' (via material culture such as handaxes) when other group members were closely related and regularly seen – conversely, larger territories may have resulted in less frequent contact with more distantly related individuals. To draw on an example from later prehistory, Kuhn et al. (2001), noted a paucity of symbolic and 'display' items in the context of *H. sapiens* colonisation of the Levant, stating that 'the benefits of efficient visual communication, especially at a distance, depend on the likelihood of encountering someone

less familiar' (emphasis added). It would be prudent to apply such a model very cautiously to the Lower Palaeolithic, but the pattern suggested here – that the warmer, earlier parts of MIS 9 had smaller, cruder handaxes and the later, cooler parts of MIS 9 had larger and more extravagant handaxes (i.e., a greater social importance) – could be mapped onto the results of Pearce's model quite neatly.

Chapter Eight: Symmetry.

8.1. Introduction.

It has been suggested that progressively higher levels of symmetry in handaxes should be evident throughout the Lower Palaeolithic, increasing in-step with cognitive development (Hodgson 2009; 2015; Saragusti et al. 1998). Part of this argument revolves around the cognitive ability of the Acheulean producing hominins to produce and potentially understand the meaning behind symmetrical objects. Dunbar (2003) placed the level of intentionality in Middle Pleistocene hominins such as Homo heidelbergensis at 3 – 4, approaching that of Homo sapiens at level 5 and quite sufficient to manipulate material culture with an understanding of how it will be viewed by others (Cole 2012, 2014; Hodgson 2015). The argument for handaxe symmetry advancing in approximate step with cognitive development is supported by several international studies which appear to show increasing levels of symmetry and refinement over time. Shipton et al. (2013) used 3D scanning at the Late Acheulean site of Patpara, India, measuring increasing symmetry in handaxes from earlier to later dates, a trend they linked directly to increasing cognitive ability. Similar studies of the Levantine sites of 'Ubeidiya, Gesher Benot Ya'aqov and Ma'ayan Barukh appeared to show similar trends, again using 3D scanning techniques combined with Continuous Symmetry Measure (Saragusti et al. 1998). Beyene et al. (2013) found increasing symmetry over time (from 1.6 Ma. – 1.2 Ma.) at the Konso Formation, Ethiopia, in this case using qualitative judgements to gauge symmetry. Each of these studies would seem to confirm the progressive view of handaxe symmetry.

McNabb & Cole (2015) arrived at a rather different conclusion to Hodgson (2015) in their own review of handaxe symmetry. They surmised that no evolutionary trend in handaxes from less symmetrical to more symmetrical has ever been robustly identified, pointing to the work of Couzens (2012) which found very little difference between handaxes from Rietputs, South Africa (1.4 Ma.) and the Cave of Hearths, South Africa (c. 0.5-0.3 Ma.). McNabb and Cole further noted that previous studies of symmetry have typically suffered from small numbers of sites (e.g., Shipton 2013; Couzens 2012) or from small sample sizes (e.g., Saragusti et al. 1998). Two recent British studies have pointed to opposing trends in handaxe symmetry over time. White & Foulds (2018) compared 22 British Acheulean sites ranging in age from MIS 15 - MIS 8, selected based on their stratigraphic coherence and the reliability of the original collectors. They used the FlipTest symmetry software developed by Hardaker & Dunn (2005), the methodology for which is described in chapter four.

The overall levels of symmetry in British handaxes were higher than White & Foulds' had anticipated, but crucially there was no clear trend in their data in terms of progression from less to more symmetrical (shown in figure 8.1).

In fact, the levels of symmetry apparent in the most recent sites in their study, those assigned to

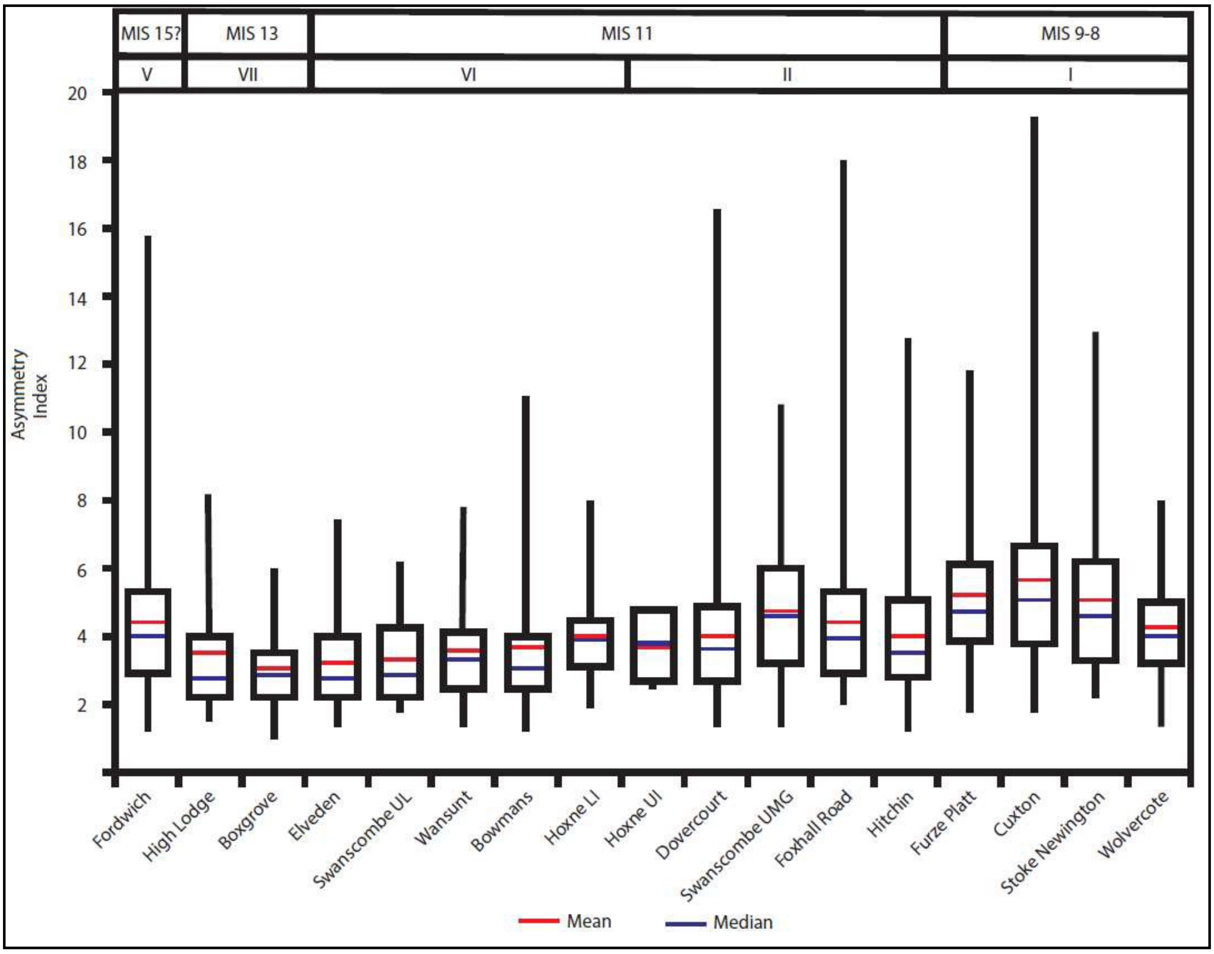


Figure 8.1. Box and Whisker chart from White & Foulds (2018), also reproduced in Figure 2.7, showing symmetry measures for handaxe assemblages (sorted according to Roe's groups).

Roe's (1968a) Groups I and III and thought to be of MIS 10 – 8 age (Bridgland & White 2014 and 2015; White et al. 2018), were distinctly varied, showing a spread of results from HSC 2 – 6 . Group II sites (strongly associated with MIS 11 age) showed a very slightly stronger tendency towards higher symmetry, whilst Groups VI and VII sites (MIS 11 and MIS 13 respectively) showed the highest levels of symmetry. The results presented in White and Foulds (2018) suggested that British handaxes became generally less symmetrical over time, certainly from peak symmetry in Group VII (MIS 13) and Group VI (representing at least part of MIS 11). Hoggard et al. (2019) also charted symmetry in British handaxes, using a GMM methodology combined with an Elliptical Fourier Analysis to map changes in handaxe shape and symmetry over the Lower Palaeolithic. This methodology has a proven utility in charting handaxe shape (e.g., Archer & Braun 2010; Costa 2010), but large-scale comparative studies had not previously been undertaken. Hoggard and colleagues assessed nine British Acheulean sites spanning MIS 13 - 7, with the Middle Palaeolithic (MIS 3) Mousterian of Acheulean Tradition (MTA) site of Lynford included for comparative purposes. Their data drew on a combination of photographs taken by the authors and images contained within the Archaeological Data Service database (Marshall et al. 2002). Their conclusions were less equivocal, stating that diversity in both shape and symmetry increased from MIS 13 to MIS 7, broadly confirming White & Fould's (2018) findings. Hoggard et al. (2019) found that the most symmetrical handaxe sites (e.g., Boxgrove, Lynford Quarry) represented single episode in situ accumulations, and speculated that the palimpsestic nature of many Lower Palaeolithic sites, (including the possibility of derived artefacts from previous interglacial episodes), might partially explain the apparent increase in shape and symmetry diversity from MIS 13 to MIS 7.

8.2. Symmetry in the MIS 9 British handaxe assemblages.

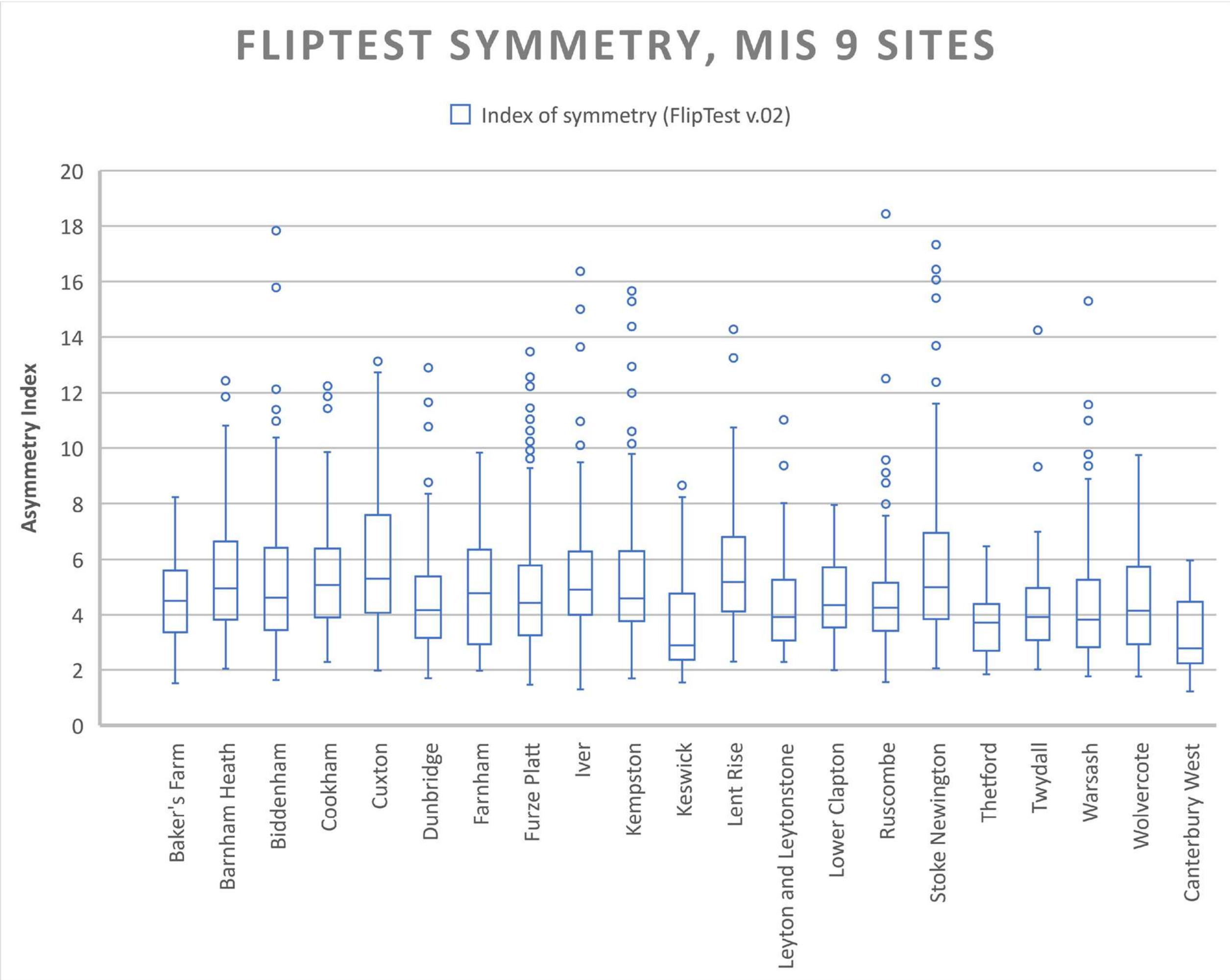


Figure 8.2. A box-and-whisker plot comparing the symmetry of MIS 9 handaxe assemblages, with the mean IOA value indicated by the blue horizontal line within the box.

The results of the FlipTest symmetry analysis in the present study are consistent with the results shown in White & Foulds (2018), pointing to a high diversity in symmetry across most sites but average IOA values generally in the range 4 – 6 (corresponding to HSC 3 – 6, moderate to very low symmetry). As shown in the box-and-whisker plot (figure 8.2, above), there was variation both within and between sites; Keswick and Canterbury West both showed exceptionally high levels of symmetry (perhaps reflecting collection bias, and magnified due to the small sample size in both cases); Cuxton and Stoke Newington had generally low levels of symmetry, the former perhaps due to the influence of irregular raw material shapes, the latter due to the high incidence of type E (small, crude) handaxes. That said, there are no clear differences in symmetry between the putative sub-groups IA and IB.

8.3. The social 'meaning' of handaxe symmetry.

Cultural tradition can account for the variation observed in handaxes but cannot alone account for the attention paid to producing refined, bilaterally symmetrical objects. Experimental evidence suggests that high symmetry provided no real functional advantage in terms of butchery: the seemingly excessive effort put into making handaxes has led to discussions of possible social 'meaning'. Gamble (1999) considered the handaxe to be a means of expressing identity: Pope et al. (2006) and McNabb (2011) extended this idea to view the handaxe as fulfilling a semiotic role, in some ways a precursor to syntactical language. Kohn & Mithen (1999) advocated for a Darwinian interpretation, suggesting that highly symmetrical handaxes were a signal of male sexual fitness, whilst Spikins (2012) suggested that they signalled trustworthiness within and between groups as a mechanism for social cohesion. White & Foulds (2018) approached the increasingly congested arguments about handaxe symmetry from a new angle, suggesting that whilst the 'meaning' of the handaxe may have been rooted in food preparation, social or sexual signalling or more generally 'display', the often-excessive attention to symmetry was the result of a pleasure-reward system linked to dopamine release in the brain (in essence, that producing a symmetrical object made the maker feel good).

Rather than attempting to weigh in on these interesting but untestable hypotheses, the following chapter will present an argument suggesting that the reduced symmetry (or greater diversity in symmetry) measured on MIS 9 handaxes was the result of ergonomic features, which were often imposed at the expense of planform symmetry.

8.4. Asymmetric Prehensile Features.

Each handaxe in this study was assessed for technological attributes. These novel attributes could be split into profile features (plano-convexity, twisted edges) and planform features (cortical backing, *méplat* features, macroscopic asymmetry, and unusual features such as 'notching' of the tip). Many of the planform features potentially relate to outfitting the handaxe with prehensile properties and constitute a form of backing. These features will be the subject of the following discussion.

As shown in chapter five, compelling examples of each attribute were recorded across a wide range of sites, and at certain sites appeared to form a significant component of the assemblage. This is most famously true of the plano-convex handaxes at Wolvercote, but other significant examples were the 'lopsided' handaxes from Broom (Green & Hosfield 2013), the cortically gripped handaxes at Cuxton (Shaw & White 2003), and the occurrence of asymmetrical demi-ficrons at Baker's Farm and a handful of other Middle Thames sites (Cranshaw 1983). Many of the potentially prehensile attributes satisfy Wynn & Gowlett's basic design imperatives of 'skewness' and 'glob-butt' (Wynn & Gowlett 2016), but it will be argued that these features are likely to have been more commonly applied to MIS 9 handaxes than in previous interglacials. It will then be argued that such features suggest an engagement with ergonomics – particularly the provision of simple 'backing' – which in some ways presages later (Middle Palaeolithic) technological developments.

8.4.1. Cortical backing.

Retained cortex 'grips' or handles (hereafter referred to as cortical backing) were identified on handaxes where retained cortex impinged on both dorsal and ventral faces as well as one or both edges (thereby providing a relatively smooth, unworked area with prehensile qualities). Such handaxes were identified at every site besides Keswick and Thetford. The proportions of cortically backed handaxes were extremely variable, but cortically backed handaxes made up a significant proportion (>10%) of the assemblages from Baker's Farm, Barnham Heath, Biddenham, Cuxton, Lent Rise, Stoke Newington and Tywdall.

The most striking examples of cortex retention come from Cuxton; a selection of these implements are shown in figure 8.3. The raw material resource local to Cuxton includes 'burrow or pipe flints', which are characteristically elongated and cylindrical (Shaw & White 2003). Shaw & White (2003) suggested that the distinctive forms at Cuxton were the result of knappers following a 'path of least resistance', where the points of handaxes were sharpened and the butts left unworked. Although the specific case of Cuxton disagreed with White's original 'raw material hypothesis' (e.g., White 1995, 1998) in that the handaxes were made primarily on nodules derived from chalk rather than river gravels, Shaw & White (2003) considered the elongate raw materials as a limiting factor on producing ovate handaxes. White's more recent work would suggest that cultural preference rather than raw material was the primary influence on handaxe shape (e.g., Bridgland & White 2014, 2015; Shipton & White 2020). The cortically backed Cuxton handaxes may therefore instead be viewed as a creative exploitation of the available raw material, incorporating ergonomic features whilst retaining the overarching metrical preferences typical of the wider MIS 9 Group IA culture. This may be linked to White's recent work looking at the dual role of design and workmanship in the production of handaxes (White in prep.).

White used a concept of 'design' proposed by the designer David Pye, as something which 'chooses that the things we use should look as they do' (Pye, 1978. 11.). The concept of design is ultimately constrained by economic and functional considerations but allows considerable flexibility in terms of the imposition of form within these constraints. As such, an object may be deliberately manufactured with a form which satisfies the basic demands of function but is ultimately controlled by the whims of the manufacturer. These embellishments were termed 'useless work' by Pye, a term perhaps inadvertently echoes by scholars of the Lower Palaeolithic when describing 'over-engineered' giant handaxes (e.g., Hodgson 2015). Crucially, this understanding of design does not require elements of functionality, economy and aesthetics to be extricated from one another, but views the resultant artefact as the product of a fully intended design. The concept of design in ancient humans is predicated on the concept of a 'mental template' (e.g., Sharon 2007; Garcia-Medrano et al., 2019), which in its simplest expression is a pre-formed idea of the shape and function an artefact should take which is 'informed by function, technology, materials and culture, all passed down by tradition' (White in prep.).

Workmanship in the context of the Lower Palaeolithic relates to the ability of a hominin to execute their designs. This may include suitable raw material selection, manual precision, dexterity, and simple good luck to avoid mistakes in knapping. Differing levels of workmanship may account for much of the intra-*type* variability observed in the archaeological record (the difference between, for example, a crude pointed type D handaxe and a finely made type F handaxe).

Under this model, the Cuxton backed handaxes may be viewed as having been designed to incorporate cortical backing on a number of different type variants, all maintaining the key ergonomic feature of a grip opposing the cutting edge. Examples of this variation in design are shown below. The selection of suitable raw materials to satisfy design criteria is a key part of workmanship; the ability to translate an abstract design into a physical object is also a factor of workmanship.

Figure 8.3. Cortically backed handaxes with 'grips' or handles formed from retained portions of the natural blank shape. From Biddenham (upper) and three examples from Cuxton (lower left and centre-left and right) and Kempston (lower right).

8.4.2. *Méplat* features.

The *méplat* is a further technological feature which was potentially imposed on a handaxe for ergonomic reasons. A *méplat* in this context is a flat, unknapped area covering a substantial part of one edge of the handaxe in a position which would facilitate a ‘comfort- area’ opposing the cutting edge (Bordes 1961; Hardaker 2003). This definition clearly overlaps with Wymer’s type L handaxe; in the present study, *méplats* were recorded where a flat area was produced or retained towards the butt of the handaxe on one edge only, resulting in an asymmetrical ‘shoulder’ which allows a comfortable grip (figure 8.4. below): this appears to have been the sense in which *méplat* was used by Hardaker (2003). The key difference between a handaxe with a *méplat* and a type L handaxe is that the former still has two worked edges.

Figure 8.4. Three Furze Platt handaxes with méplat features to the lower right (dorsal face).

Méplat features were identified on ‘several’ handaxes at Gravelly Guy (Stanton Harcourt), as well as isolated find spots nearby, leading Hardaker (2003) to tentatively suggest a local *méplat* tradition (figure 8.5).

Figure 8.5. Handaxes identified by Hardaker as having distinctive méplat features toward the butt. The handaxes pictured are from Gravelly Guy (Stanton Harcourt) except for the brown handaxe (top centre), which was found at Linch Hill. From Hardaker (2003) Fig. 5.

8.4.3. Oblique backing.

A feature very much akin to the cortical *méplat* was also identified, which involved the removal of part of one edge in the lower third of the handaxe to produce a blunted or flat surface. Lee (2001) identified deliberately imposed oblique edges as a characteristic local trait at the Upper Thames sites of Wolvercote, Stanton Harcourt, Berinsfield and Iffley. Lee noted that the oblique edges were unlikely to be the result of natural damage or accidental fracture; they were always located at the butt, always formed from one or two large removals (sometimes with retouch), and invariably produced a flat surface. Lee (2001) suggested that such features were imposed with ergonomic function in mind, particularly where the handaxe had been produced on a blank without ergonomically useful areas of cortex. In this, Lee agreed with Cranshaw (1983), who noted similar features at Furze Platt and Baker's Farm which she interpreted as a gripping area. Examples of this feature from the Upper Thames are shown in Lee (2001), reproduced in figure 8.6.

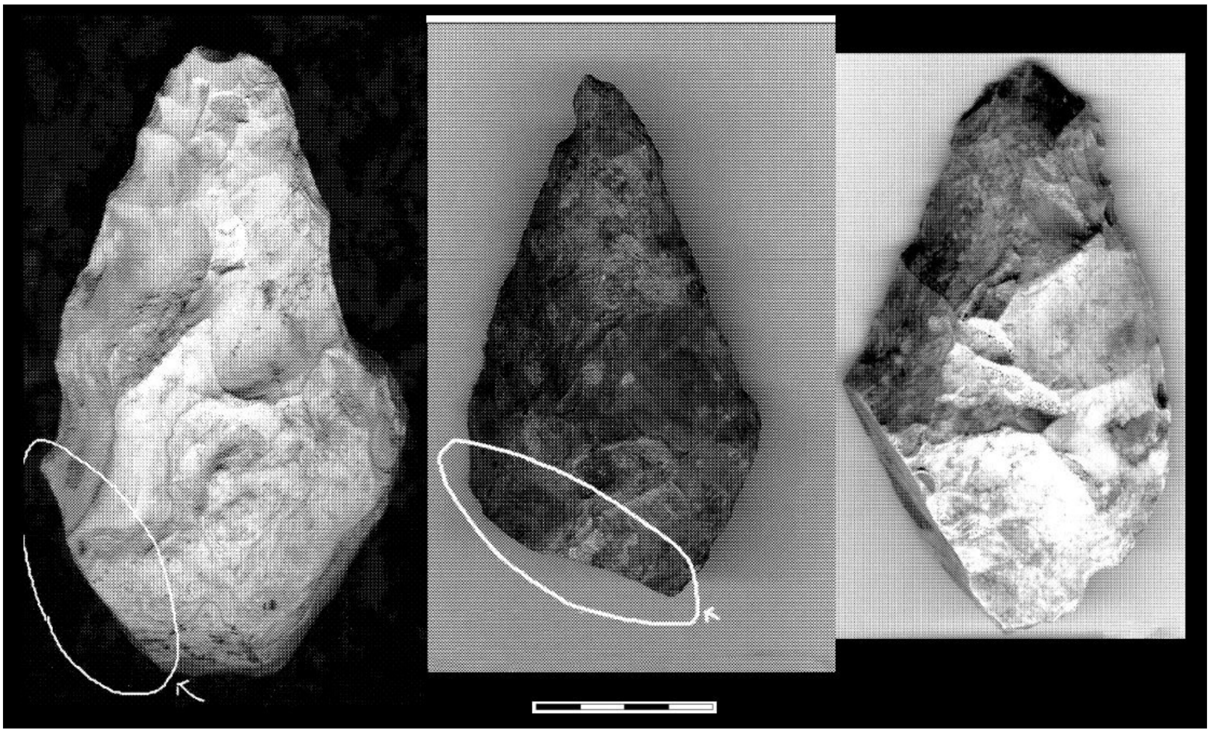


Figure 8.6. Oblique backing imposed at the butt on handaxes from Stanton Harcourt (left), Wolvercote (centre) and Berinsfield (right). The oblique edge is highlighted on the left and central image. After Lee (2001), photographs by H.W. Lee.

De Mortillet & De Mortillet (1881) illustrated a possible means of holding a pointed handaxe at the butt, providing maximum forward extension: this is reproduced below in figure 8.7.

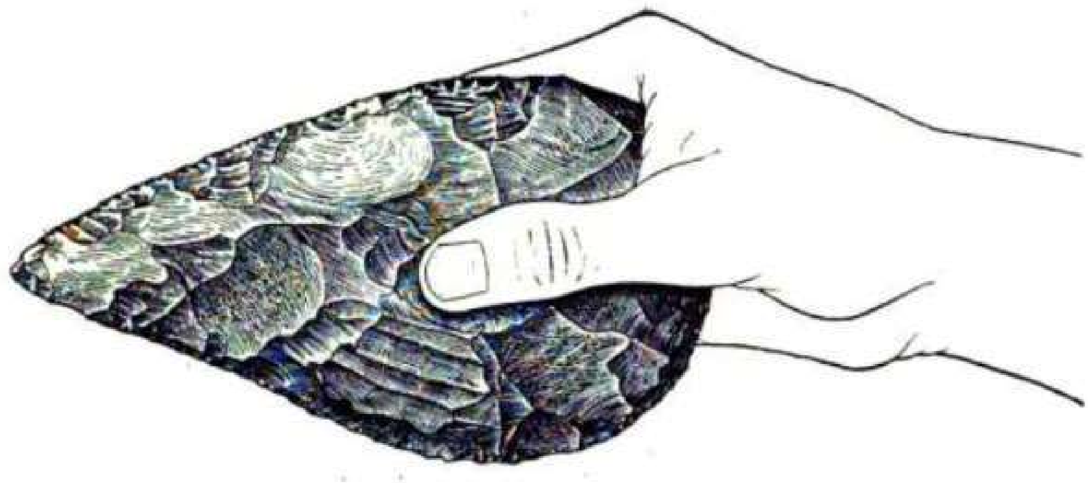


Figure 8.7. A speculated grip for a pointed handaxe, proposed by De Mortillet & De Mortillet (1881). In this suggested handhold, the long axis of the handaxe aligns with the arm of the user.

This grip would certainly have allowed force to be transmitted from the hand to the edge, however it may be suggested that if the location of the grip were worked to an edge, there would be a risk of discomfort (if not injury). An alternative grip, making greater use of the thumb opposed to the middle and index finger, might be suggested (shown in the upper part of figure 8.8).

The handhold suggested by De Mortillet & De Mortillet would have benefitted from an obliquely backed area as demonstrated in the lower part of figure 8.8., although it should be noted that the handhold is speculative and has not been demonstrated experimentally. This grip may have allowed the cutting edge to be pushed more forcefully into the target material without discomfort of risk of injury.

Figure 8.8. A demonstration of the possible ergonomic advantage of an obliquely backed handaxe. A 'normal' pointed handaxe (Aylesford) is shown in the upper image; the most comfortable way to hold it, in the authors opinion, was something like a modern scalpel. In contrast, the obliquely backed area on the lower handaxe (Ham Hill) allowed the handaxe to be more comfortably couched in the palm of the hand. Presumably, this would allow more of a 'pushing' action, exerting more force onto the cutting edge.

Similar features were noted across many of the sites in the present study, as summarised in chapter five. There was no readily apparent geographical patterning, although the feature occurred relatively frequently at some sites and was absent at others. Cranshaw recorded the imposition of oblique edges as ‘symmetrical grips’ (Cranshaw 1983); this was sometimes found to be the case, as illustrated below in the handaxe from Ruscombe below (figure 8.9.) where the oblique edge mirrors the planform outline of an area of retained cortex on the opposing side, perhaps providing the tool with two usable grips and therefore making both edges viable. On the other hand, the imposition of an oblique edge often formed an asymmetrical shoulder, as in the examples from Lee (2001) shown above (figure 8.6), and in the example from Twydall shown below (figure 8.10).

Figure 8.9. A Ruscombe handaxe where the imposition of oblique backing (visible at the lower left of the ventral view, right) has increased the overall symmetry of the object by mirroring a corticated area on the opposing edge.

Figure 8.10. An ovate handaxe from Twydall, where the oblique edge breaks the overall planform symmetry of the object. This was most commonly the case with handaxes where an oblique 'shoulder' had been added. The steep angle of the oblique edge here may have allowed more force to be comfortably transmitted to the opposing (cutting) edge, in line with suggestions by Cranshaw (1983) and Lee (2001).

Figure 8.11. Two obliquely backed handaxes from Biddenham, showing dorsal and profile views for each. Note that the example on the left is also macroscopically asymmetrical.

8.4.4. Type L handaxes.

Wymer's typology accommodated some backed handaxes as '(Type L) Segmental Chopping Tools' (Wymer 1968). Wymer described the type as having one sharp edge opposing a 'thick and flat' edge, which he speculated would have afforded a handgrip. He also called this uncommon type a 'tea-cosy implement' on account of its semi-circular or ellipsoidal planform shape of some examples. Wymer suggested that the type did not come about until 'the Late-Middle stage of the Acheulean culture', citing a handful of occurrences in the Swanscombe Upper Loam (MIS 11) (Wymer 1968). The type was applied slightly more loosely in the present study, encompassing any handaxe where a cutting edge was opposed by a cortical or blunted edge for the majority of its length (but regardless of overall planform shape). In practise, a type L handaxe could grade into any other type with a significant fraction of one edge blunted (see examples above).

Wymer's thoughts on the Type L are intriguing; he suggested that 'they would have served well for chopping bone or wood and, unlike normal hand-axes, would have been of little use for anything else' (Wymer 1968, 57). The present author is unaware of any experimental support for this supposition, but the comparison to cleaver types would appear to be valid based on the shared transverse cutting edge on both types. Rather than 'choppers', backed handaxes may have functioned as knives, with the long cutting edge and ergonomic qualities of the backing increasing cutting efficiency (Beyries & Boëda 1983).

Figure 8.12. Two possible examples of type L handaxes from Iver (left) and Furze Platt (right). The type was distinctly rare, both in the present study and in Wymer (1968). The diversity of forms within the type also suggests that the opposition of a cutting edge to a backed edge was more significant than a standardised form

8.4.5. Macroscopically asymmetrical (lopsided) handaxes.

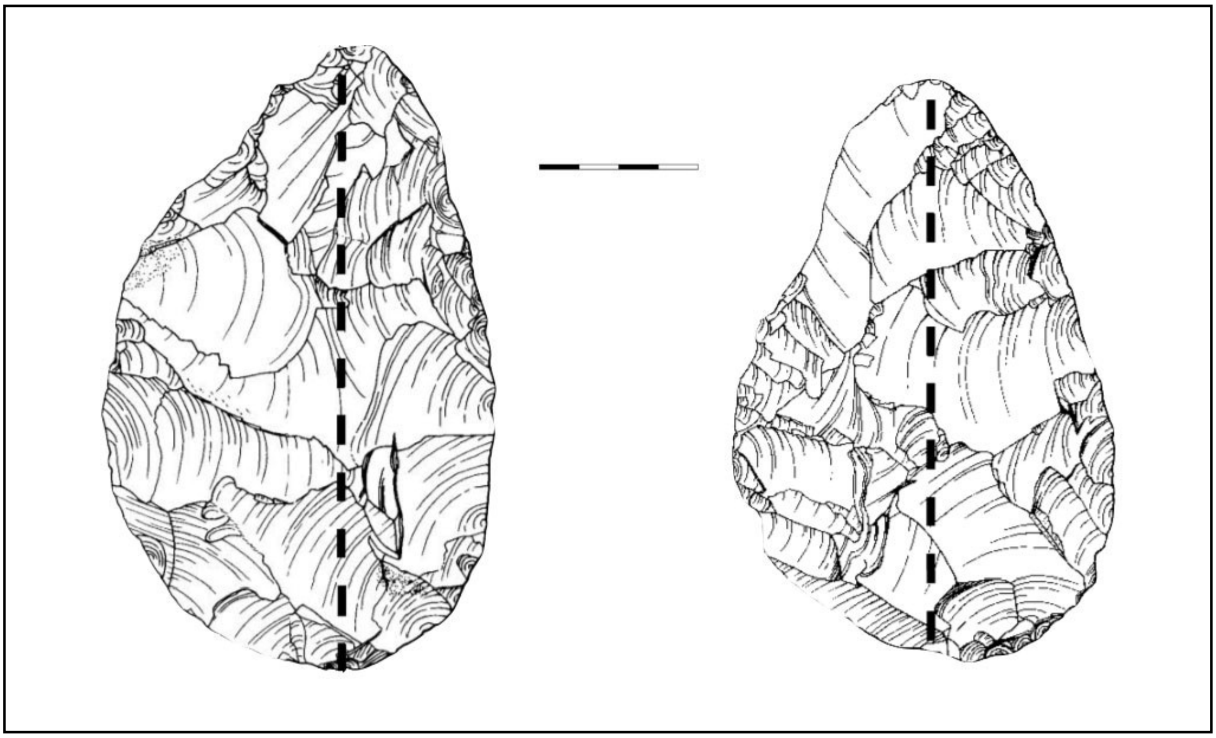


Figure 8.13. Two macroscopically asymmetrical ('lopsided') handaxes from Broom. The long axis of reflective symmetry is shown as a dashed line. Image from Hosfield & Chambers (2009), Figure 7, p. 69.

Figure 8.14. A macroscopically asymmetrical handaxe of the 'Broom type', from Furze Platt. In practise, this type merged imperceptibly into demificrons; only the convex edge (the right edge in this case) distinguished the two.

Handaxes with pronounced, macroscopic planform asymmetry were a notable feature of the Broom handaxe assemblage. Such handaxes were described as having an ‘exaggerated convex edge on either the left or right lateral, opposed by either a straight edge… or a less-exaggerated convex edge’ (Hosfield et al., 2013b). In essence this created a visible lopsidedness in the lower or middle third of the handaxe (examples shown in figures 8.13 and 8.14). Hosfield & Chambers (2009) argued that the detection of these ‘significant’ asymmetrical features should be made by eye, as they would have appeared to the original knapper (a variation on the methodology of McNabb et al., 2004, who based their judgements of symmetry on *mental* projections of mirror symmetry across the long axis). This is in contrast to methods which involve counting pixels to detect mirror symmetry in digital images, for example the FlipTest as used in the present study, (Hardaker & Dunn 2005) or quantitative analyses such as the Continuous Symmetry Measure (outlined in Saragusti et al., 1998). The IOA value produced by the FlipTest method would not differentiate between a handaxe with highly irregular planform outline (perhaps made on irregular raw material) and a well-made macroscopically asymmetrical (lopsided) handaxe, which is why the visual detection strategy of Hosfield & Chambers (2009; Hosfield et al., 2013) was followed in the present study alongside a FlipTest analysis. There is clearly a high potential for inter-analyst variation in such a qualitative, subjective methodology. This is demonstrated by the different proportions of lopsided handaxes suggested for Broom; Hosfield et al., (2013b) recorded macroscopic asymmetry on 24.1% (n=235) of their Broom sample, whereas the previous analysis of the Broom assemblage by C.E. Bean recorded 50.9% of the assemblage as his ‘type 4’ (his description of lopsidedness) (in Hosfield et al., 2013b). At Broom, asymmetrical planforms were recorded on all types except for cleavers and ‘flat-butted cordates’, although they were more common on rounded (ovate/ cordate) types than pointed types. The typological variety of lopsided Broom handaxes is illustrates clearly in figure 8.15.

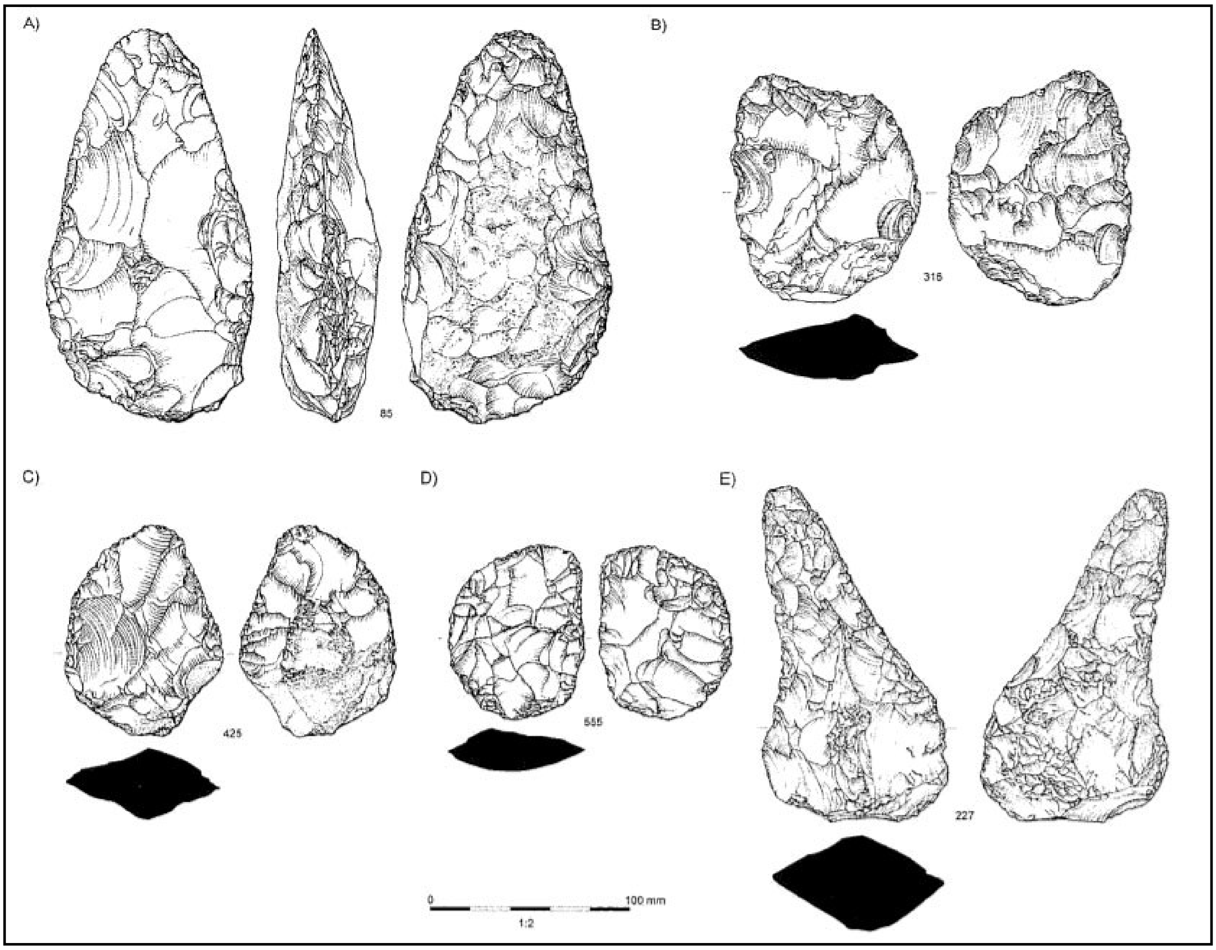


Figure 8.15. A selection of Broom handaxes showing the range of types which were macroscopically asymmetrical, and the varying degree of asymmetry identified. Figure from Hosfield et al., (2013b), Fig.9.1, p. 218.

The present study made a distinction between asymmetrical pointed types (recorded as demificrons) and asymmetrical handaxes of other (rounded) types (recorded as ficron related tools), but the distinction was essentially an arbitrary one. It should be stressed that, while macroscopically asymmetrical handaxes were present at most sites in the present study, their proportions did not come close to the 24.1% observed at Broom, meaning the site remains something of an oddity in MIS 9 Britain.

Hosfield et al., (2013c) outlined three possible explanations for the distinctive lopsided forms seen at Broom; these are summarised below.

- *Weak social learning*.

The diverse application of symmetry in the Broom handaxes and elsewhere could represent stochastic 'noise' or continuous variation, as opposed to being a distinct tradition. This may be attributed to weak social learning pressures. Mithen (1994) suggested that smaller social groups may result in greater diversity in tool form because the influence of cultural traditions would be weaker in such groups. Hosfield et al. (2013c) supported this idea by pointing to the apparently declining population in the south-west of England in MIS 10 – 8 (Wymer 1999; Hosfield et al. 2006; Ashton & Hosfield 2010) but noted that whilst weak social learning may account for the presence of seemingly deliberate asymmetry, it cannot alone account for the persistence or distinctiveness of the lopsided forms frequently observed at Broom.

- *Idiosyncratic design and reproduction*.

The Broom handaxe site was deemed to be a single occupation phase, enduring for no more than a few generations. The asymmetrical handaxes may be the result of the manufacture and reproduction of an idiosyncratic design by a single knapper or small group of knappers. The lopsided design represents initial inventiveness on the part of the knapper (Nowell & White 2010).

- *Functional asymmetry*.

The distinctive lopsided asymmetry of the Broom handaxes was considered ‘in terms of its prehensile properties’ (Hosfield et al., 2013c). This is directly relevant to the suggested (cortical and non-cortical) backing observed on handaxes in the present study, as Hosfield and colleagues suggested that asymmetry noted at Broom might function as a sort of ‘backing’, allowing a greater force to be exerted, perhaps in conjunction with some sort of protection (e.g., animal skins) to prevent injury to the hand. An ethnographic analogue for this arrangement can be found in the use of organic backing materials on Australian (Aboriginal) bifaces, as shown in figure 8.17.

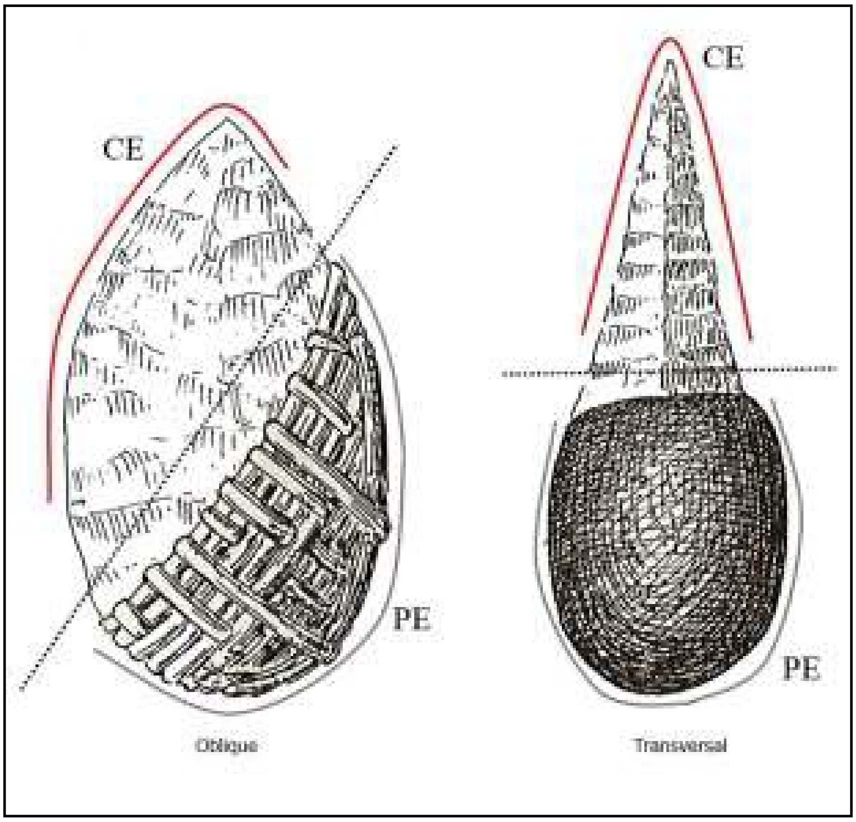


Figure 8.17. Image of an Australian (Aboriginal) biface with organic backing, comparable to the suggestion by Hosfield et al., (2013c) for lopsided handaxes. The Cutting Edge (CE) is obliquely opposite the Prehensile Edge (PE). Image from Viallet (2019).

The size and refinement of many of the asymmetrical Broom handaxes was suggestive of light work, arguing against the application of extreme pressure – this point is less relevant to other sites in the present study, where backed handaxes were found in a wide range of sizes. Hosfield et al., (2013c) suggested that asymmetry represented a functional advantage specific to the users or manufacturers own distinctive preferences at the time of manufacture.

8.4.6. Comparable examples from Europe.

'Backed' handaxes have been identified widely in European contexts, with a variety of names (particularly *biface a dos*) (Bosinski 1968; Bordes 1971). In France, the assemblage from Petit-Bost, Dordogne contains handaxes explicitly described as being backed. The Acheulean bearing Layer 2 was dated by TL to 290 – 340 kya., making it temporally relevant to the present study (Lahaye 2005; Bourguignon et al., 2008). Of the Petit-Bost handaxe assemblage, Mathias and colleagues said, 'a constant is the maintenance of a cortical area on the proximal part, corresponding to the possible prehensile part', suggesting a systematic interest in ergonomic functionality at that site (Mathias et al., 2020). More generally, latest Lower Palaeolithic and Early Middle Palaeolithic handaxes in Southern France had butts which were 'typically cortical and thick [which] may possibly have served as prehensile parts', and 'point-like tools' with 'linear edges' were typical (Mathias et al., 2020). This provides a clear, if broad, analogue with the latest British handaxes (MIS 9 – 7).

One of the most compelling comparisons with the European record can be made with the cluster of sites in the Frosinone-Ceprano basin, central Italy (MIS 11-10) (Moncel et al., 2020a). The handaxes at these sites were typically made on limestone with smaller proportions of derived flint and quartz, making direct comparison with the overwhelmingly flint artefacts in Britain difficult. However, the key characteristics of these assemblages were their generally large size and high degree of elongation, the imposition or retention of 'backing' on a significant number of the handaxes, and the frequent occurrence of plano-convex profiles, all of which have also been identified in the British MIS 9 record. At Colle Avarone, Italy, seven handaxes were produced with cortical butts with preferential working along one edge, resulting in 'a cortical back (pebble side)' (Moncel et al., 2020a). Likewise, at Campogrande (A), Italy, the distinguishing feature of the handaxe assemblage was the presence of a 'back' on some tools, along with a general preference for elongated points (Biddittu et al., 2020; Moncel et al., 2020a). Backed handaxes were also noted at the two nearby sites at Lademagne and Masseria Castellone, Italy (Biddittu et al., 2012; Moncel et al., 2020a). Whilst some of the 'backing' noted was an exploitation of the natural form of the blank used (e.g., the Colle Avarone examples), in other cases 'backing' was created through the imposition of asymmetry, in a clear parallel to Broom (e.g., Green & Hosfield 2013). One such example, from Masseria Castellone, Italy, is shown below (figure 8.17).

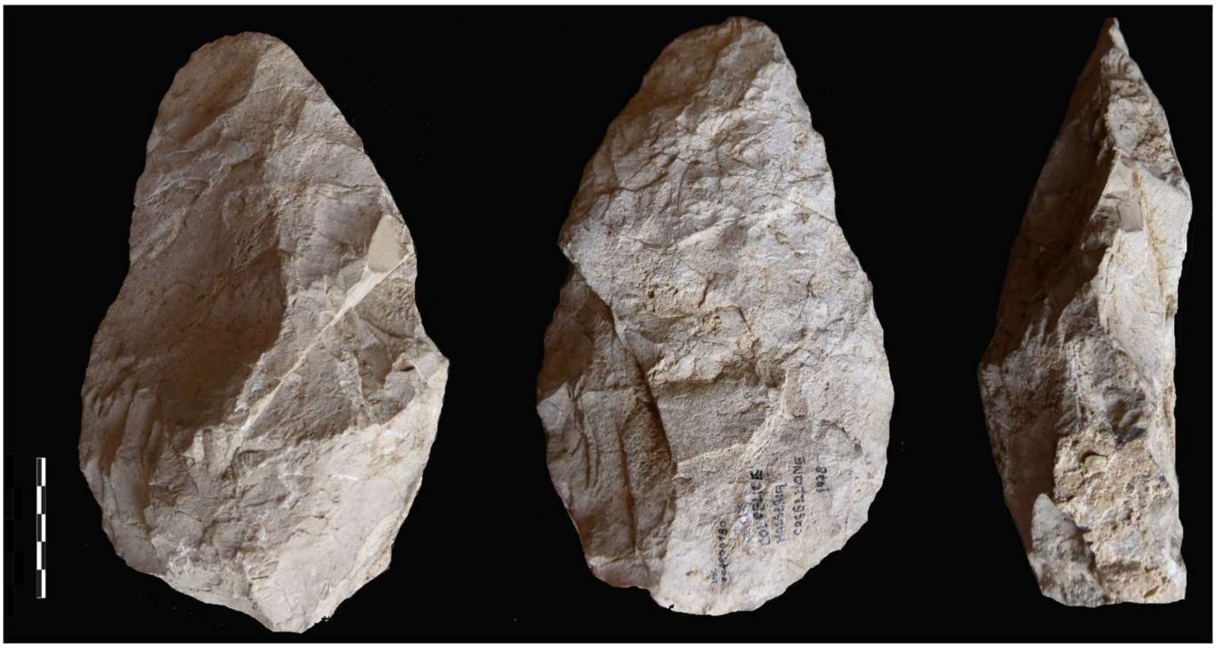


Figure 8.17. An example of an asymmetrical 'lopsided' handaxe, closely resembling the lopsided handaxes identified at Broom, which has a 'backed' area (seen in the profile view, right) from Masseria Castellone, Italy (Figure from Moncel et al. (2020a), Figure 18, p.185.

Further afield, the role of design in producing backed handaxes was highlighted at Tabun (layer E), Israel. In this case, handaxes were produced on specially selected raw materials then reduced 'to a predetermined design' (Matskevitch et al., 2001), which often involved retained cortex to enhance the prehensile qualities of the artefact (Shimelmitz et al., 2017). Crucially, the retained cortex was not indicative of deficient workmanship, an interpretation strongly supported here based on the often finely made but heavily corticated Cuxton handaxes. Matskevitch and colleagues considered the production of 'handled' handaxes and *prodniks* to be a culturally significant trait, although they were numerically only a small component of the Tabun E assemblage (Matskevitch et al., 2001). Tabun E was dated by TL to 350 – 270 kya. (Mercier et al., 1995), again making the site chronologically relevant site to this study.

8.4.7. Significance.

Flexibly manufactured, asymmetrical backed bifacial tools become more common later in prehistory, particularly the later Middle Palaeolithic; this is particularly true of the toolkit of the Central and Eastern European Micoquian (CEEM) where a variety of formally named backed types such as *Prodniks*, *Halbkeile* and *Faustkeilblaetter* are common (Matskevich et al. 2001; Joris 2006; Wiśniewski et al., 2020). Backing was also a feature of the transitional Acheuleo-Yabrudian industry of the Levant and became more commonplace on western European debitage technologies (particularly those produced by the Quina method) in the Late Middle Palaeolithic (Turq 2000; Kuhn 2013). The suggestion is not that the putative backed handaxes of MIS 9 Britain were the cultural antecedents of these later tools, but rather that they represented an attempt to solve similar problems (i.e., the comfortable transmission of force from the hand to the cutting edge) in a similar manner.

Chapter Nine: Resharpening.

9.1. Introduction.

Resharpening was advanced as an explanation for variability in handaxe form by McPherron (1994, 1995, 1999, 2003), who suggested that the handaxes were initially produced as pointed types and gradually reduced to ovate forms through the maintenance of sharp cutting edges at the tip of the tool. McPherron's 'resharpening hypothesis' was challenged on two main fronts, summarised here:

1. Ovate handaxes tend to be wider at 0.5*L than pointed handaxes within single assemblages, meaning that the former cannot have been reduced from the latter.
2. Roughouts and rare refitting elements, particularly at Boxgrove, show that both points and ovates were manufactured in the first instance and were therefore not the product of resharpening.

In addition, it may be pointed out that in the specific case of MIS 9 ovate handaxes were distinctly rare; even if McPherron's hypothesis were accepted in general terms, there would be no convincing evidence for the resharpening of points into ovates in MIS 9 simply based on the point dominated archaeological record. The rejection of the 'resharpening hypothesis' need not imply that resharpening did not occur in *any* form in the Lower Palaeolithic, however, and several possible cases of resharpening may be suggested, including for the potentially chronologically restricted forms found in MIS 9 (the cleaver and ficron, the plano-convex handaxe, and the lopsided handaxe):

9.2. Recycling.

Handaxe recycling may only be identified in cases where the pause between initial discard and resharpening resulted in differential patination (e.g., Brumm et al. 2019), or where a broken handaxe fragment has been reworked into a usable tool (e.g., an example of such in Green & Hosfield 2013). Examples of both were identified in the studied handaxes, although in very low numbers (less than 1% of the total sample, and probably much less given the difficulty in identifying differential patination). A probable example of a recycled handaxe is shown below in figure 9.1; another example with multiple phases of recycling from Stoke Newington is shown in figure 9.2 (Smith 1884). Brumm et al. (2019) provided examples from a number of British Lower Palaeolithic sites of widely different ages, suggesting that this behaviour occurred throughout the Lower Palaeolithic, and therefore there is no strong evidence that recycling was a novel behaviour restricted to MIS 9. It may be better viewed as an opportunistic way to produce a usable tool with minimal effort, rather than strictly 'resharpening'.

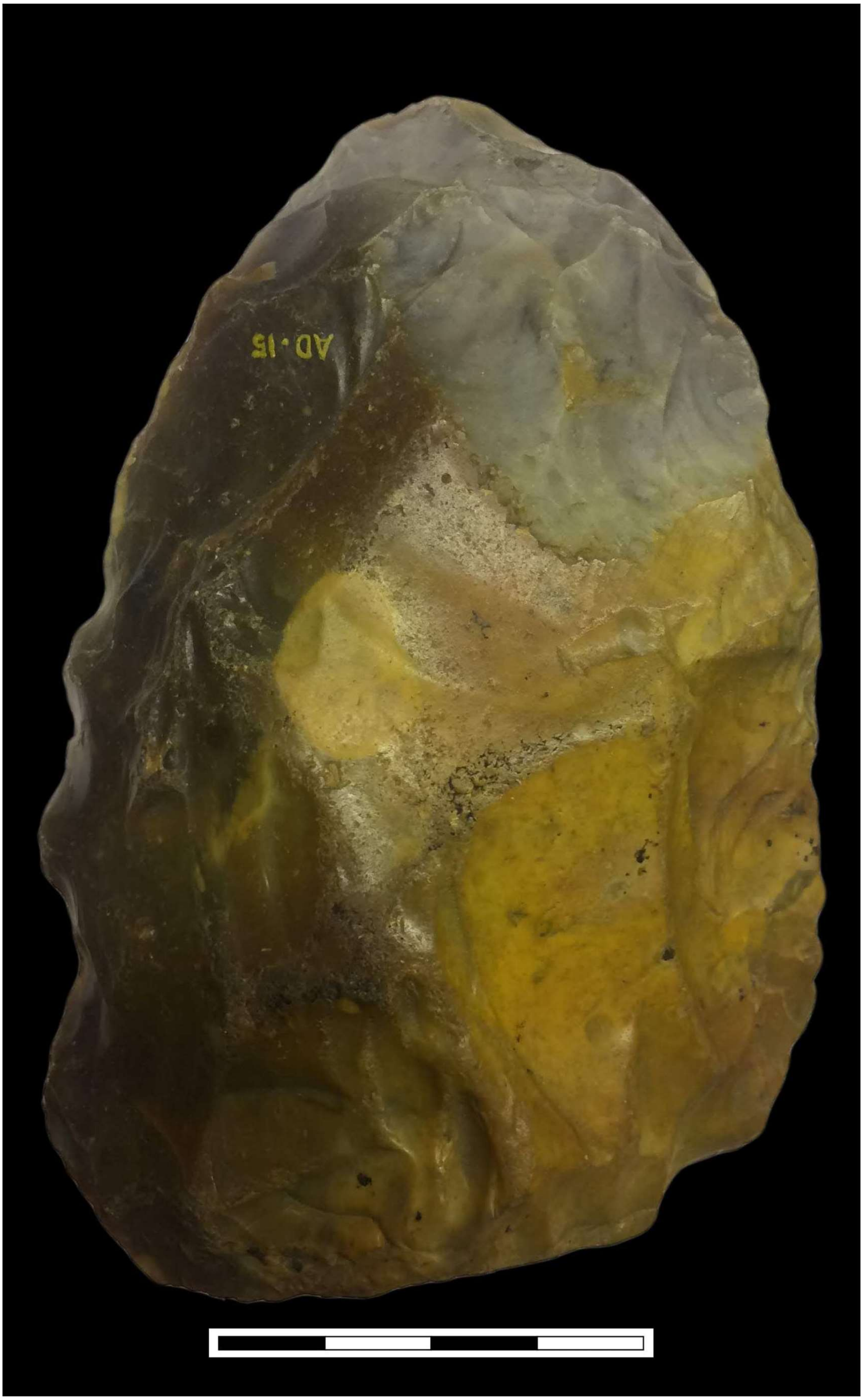


Figure 9.1. A probable case of resharpening to the top-right of the dorsal face, indicated by differential patination. Handaxe from Furze Platt.

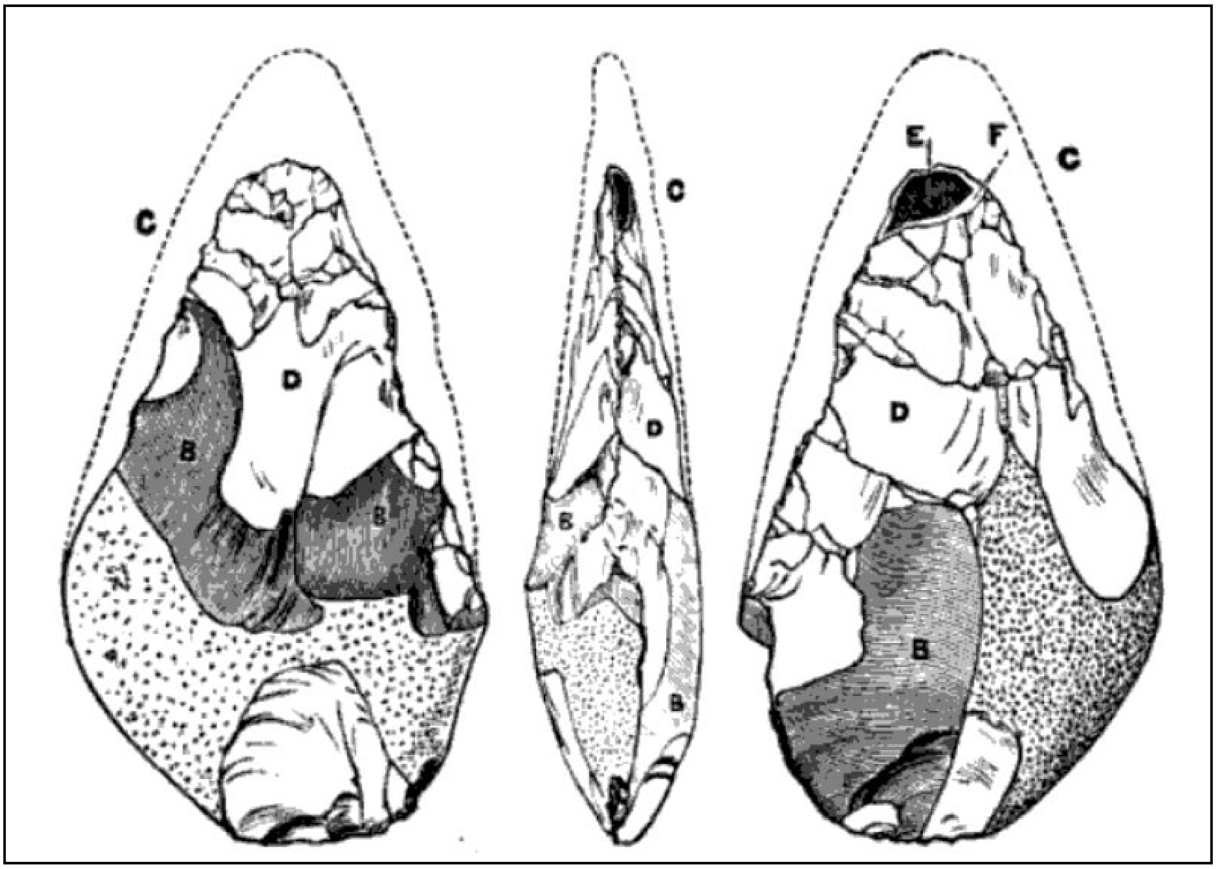


Figure 9.2. A handaxe from Stoke Newington with sufficiently contrasting patination to allow the identification of multiple phases of reworking (indicated by letters A - F), in a probable example of recycling. Figure from Smith (1884).

9.3. Cleavers.

As discussed above (chapter seven) White (2006) suggested that *tranchet* finished cleavers might represent resharpened tools. The evidence presented in this study is equivocal on this matter: the interpretation favoured here is that handaxes were sometimes resharpened into cleavers both through *tranchet* removals and conventional reduction, but only selectively (generally the largest examples of ovates and sub-cordates). Cleavers of a discrete type (fan-shaped or tabular cleavers) probably do not represent resharpening due to their shapes not resembling other rounded types.

9.4. Ficrons.

Davis et al., (2016) said it was 'conceivable' that ficrons could result from resharpening, presumably of pointed types. This is an interesting suggestion, but a difficult one to test. *Tranchet* finishing is rare on ficrons (although double *tranchet* removals were recorded on the 'Cuxton Giant' (Wenban-Smith 2004, 2006)), and in any case this form of finishing would not result in the characteristic biconcave planform. Figure 9.3 below shows a simple, intuitive way in which a pointed type could be reduced to a ficron type (either biconcave or single concave edges) through reduction of one or both edges whilst preserving the overall length of the handaxe.

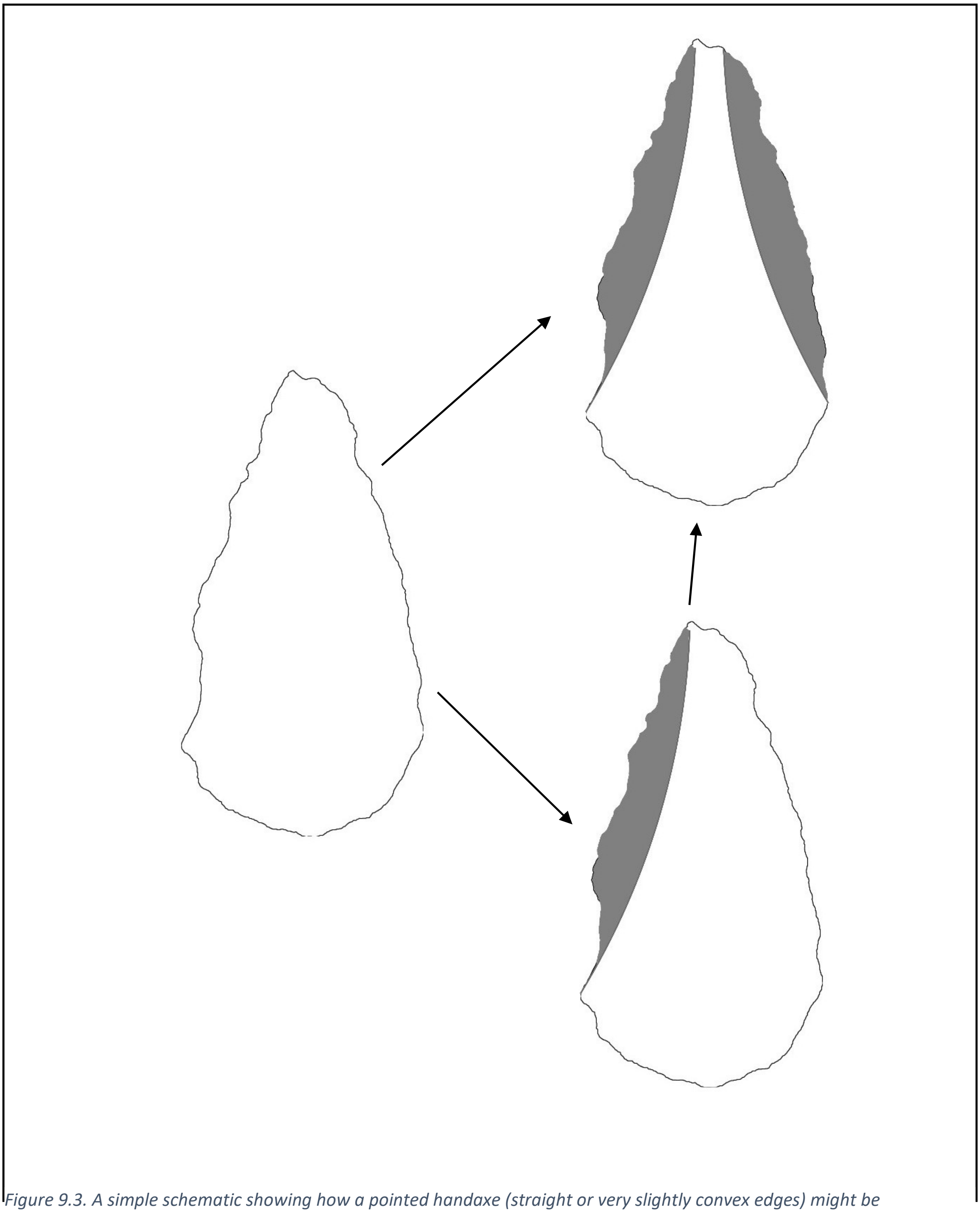


Figure 9.3. A simple schematic showing how a pointed handaxe (straight or very slightly convex edges) might be resharpened resulting in concave edges through removal of raw material (indicated by shaded areas). Differing degrees of resharpening could result in either 'marginal' ficrons or pronounced, exaggerated ficron forms; the resharpening of one edge only may result in a demificron (lower), which may in turn be transformed into a true ficron through resharpening of the opposing edge. In both cases, the long cutting edge of the tool is maintained through removal of width whilst maintaining length, resulting in the characteristically high elongation (and large size) often seen in ficrons.

It may be expected that the refinement towards the tip of the handaxe would be lower in ficrons than in pointed types, assuming the schematic above is correct. The fragility of elongate tools, and the noted frequency of breakages in ficron tips, would favour the preservation of thickness given that reduction would necessarily reduce width. This is especially the case where length is preferentially maintained, as appears to have been the case given the generally large length and elongation of ficrons. This may be simply tested by using the B1 (width at 0.2*L) and T1 (thickness at 0.2*L) metrics to produce a tip-refinement index (T1/B1). Data for all type F and type M handaxes are compared below in figure 9.10. A sub-group of larger type F handaxes (where L<150mm) are also shown, given that these handaxes are a closer match to the average size of ficron in terms of L.

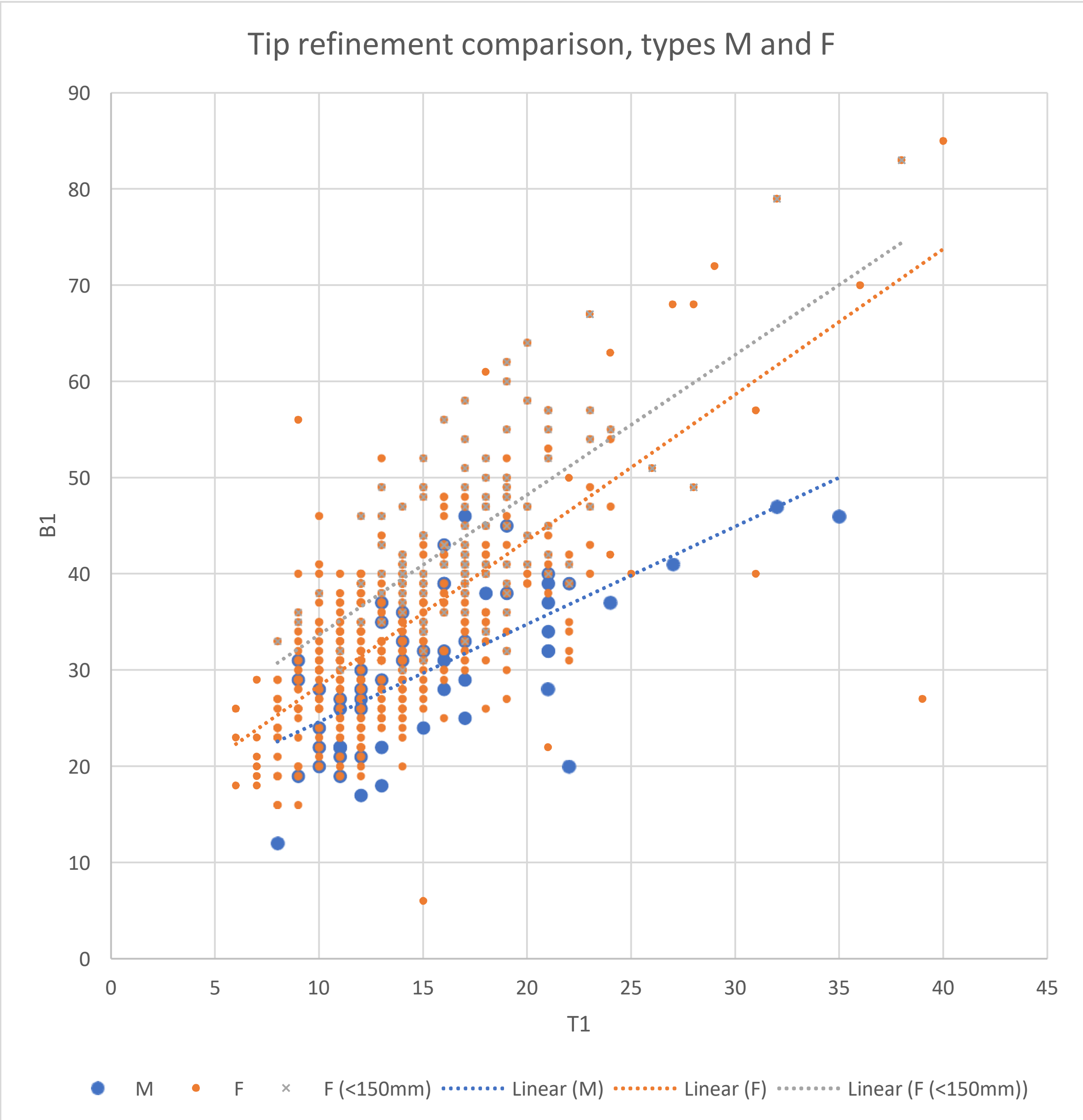


Figure 9.10. A comparison of width at 20%L (B1), and thickness at 20%L (T1) for ficrons (type M) and pointed handaxes (type F) – this ratio describes 'tip refinement'. Type F handaxes above 150mm in length are shown separately, as these are closer in size to the average type M and so provide a more suitable comparison. The pattern which might be expected if

type F handaxes were resharpened into type M handaxes by reducing width but not length is apparent; type M handaxes typically have thicker, but narrower, tips (i.e., lower tip refinement) than their type F counterparts.

The comparison of tip-refinement shows that ficrons do tend to have a lower tip-refinement than type F handaxes of all sizes. This offers some support to the notion that ficrons could have been resharpened from larger type F handaxes, although it is equally plausible that they were simply produced that way in the first instance. The generally large size of ficron handaxes (outlined in the section above) could be used to suggest that larger pointed handaxes were preferentially reduced into ficrons, possibly as an attempt to prolong the use-life of large (and perhaps valued) tools whilst also conserving the characteristic long cutting edges of larger pointed handaxes; the concept of resharpening as a strategy designed specifically to conserve valuable raw material is explored further below. In this scenario, demificrons could be the result of the preferential resharpening of one edge (c.f., Hosfield et al., (2013), who made a similar suggestion for lopsided handaxes), whilst 'true' ficrons could represent the resharpening of both edges either in an effort to retain two functional edges, or in an attempt to maintain symmetry; the latter possibility is supported by the generally high degree of symmetry in ficron handaxes. These ideas can be supported, albeit circumstantially, by the observation that the degree of edge concavity appears to occur on a continuum, which could be interpreted as differing degrees of resharpening in the use-life of a tool. Shipton & Clarkson (2015) considered the possibility of reduction resulting in ficrons in their Principal Components Analysis of morphometric data from five British handaxe sites. They noted that, whilst retouching of a handaxe above the point of maximum width *could* result in biconcave forms, they did not greatly resemble any actual examples of ficrons. However, this may be countered by suggesting that a greater degree of reduction at the mid-point of the handaxe as illustrated above (rather than towards the tip) could produce archaeologically recognisable forms. The possibility of the resharpening of large pointed handaxes into ficrons could be elucidated further by use-wear analysis of suitable tools and experimental work, both of which would provide interesting avenues of investigation but are well beyond the scope of the present study.

9.5. Plano-convex handaxes.

Plano-convex handaxes are most commonly associated with Wolvercote, but 'Wolvercote type' plano-convex handaxes were found at a handful of other sites in the south-west of Britain, and handaxes with a plano-convex profile (but not of the 'Wolvercote type') were found across southern Britain (Tyldesley 1987; Ashton 2001, 2008; Davis et al. 2016). 'Wolvercote-type' plano-convex handaxes were typically 'pyriform' (recorded as type FG in the present study), often featuring non-invasive removals resembling retouch to the tip and proximal edges. They were also typically more intensively worked on the dorsal face, which often featured a 'ridge' or *arete* feature along the long axis (Tyldesley 1986). These features were identified on 18.18% (n=8) of the flint handaxes in Tyldesley's study. Davis et al., (2016) noted similar flake patterns on a small number of Warsash handaxes (n=4), which formed part of a much larger group of plano-convex handaxes *sensu latu* (n=44) which were plano-convex due to being made on flakes, split cobbles or nodules with flat surfaces rather than through careful retouch of the dorsal face. Similar patterns were observed across most of the sites considered in the present study; plano-convex handaxes were fairly common (7.07% of the total sample (n=207)) but plano-convex handaxes of the specific 'Wolvercote-type' were almost vanishingly rare, identified only at Wolvercote and Warsash with a handful of possible candidates further afield (including Twydall, as noted by Beresford (2019)). This is consistent with observations made by Tyldesley (1987), who noted a small but measurable proportion of Wolvercote-type plano-convex handaxes at Wolvercote but only a scattering at other British sites. Ashton (2001, 2008) argued that it was this retouching of the edges which resulted in the distinctive plano-convex profile, with the differential working of the dorsal face producing a steep angle at the cutting edge (i.e., exaggerating the dorsal convexity as shown in figure 9.11).

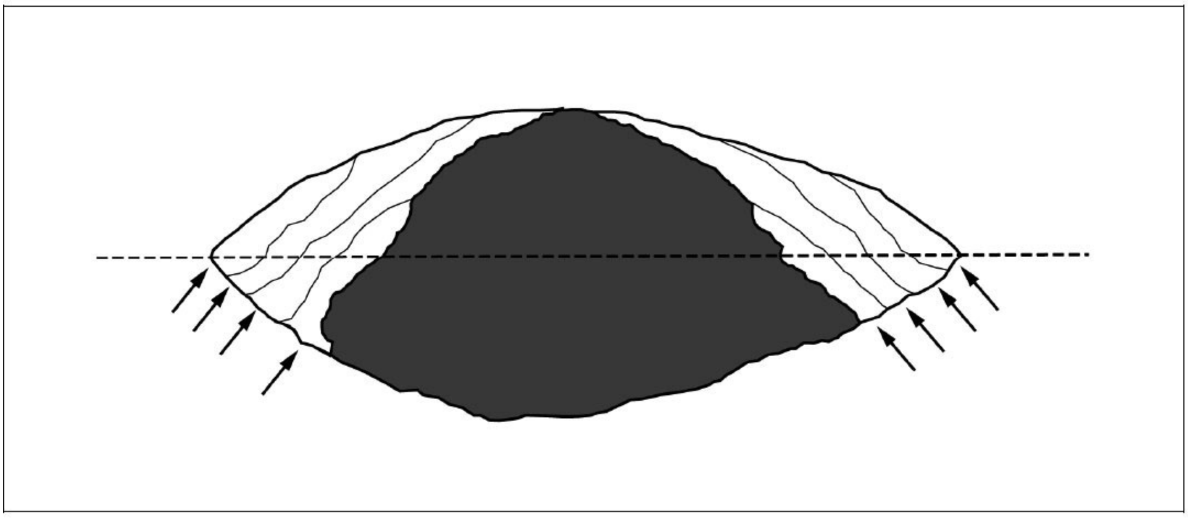


Figure 9.11. A schematic showing the potential for a handaxe which is biconvex in section to be reduced into a plano-convex handaxe through differential reduction of the dorsal face. From Ashton (2008, reply to comments), image by A. Brumm.

Neither Ashton (2002) nor Davis et al., (2016) could establish whether plano-convexity was deliberately imposed on the Wolvercote-type handaxes, or whether it was a natural but unintended consequence of the resharpening described above. Shipton & White (2020) presented evidence (in the form of a principal components analysis of morphometric data from selected British sites including Wolvercote) that resharpening was less influential on form than the geographical location of the site (i.e., that site-specific forms, presumably cultural, were more influential than resharpening). On the other hand, resharpening at sites such as Wolvercote, Boscombe and Red

Barns may have been an economising response to a relative scarcity of high-quality local raw materials (Ashton 2008), which were brought in from more distal source areas. In the case of Wolvercote, this was probably the Chilterns, some 25km away (Bridgland 1994; Briggs et al., 1985; Ashton 2008). Ashton (2001, 2008) suggested that the plano-convex form resulted from the progressive resharpening of this imported flint, as a means of conserving a valuable resource. If resharpening were a strategy deployed selectively to conserve more highly valued objects, then interesting comparisons may be suggested with the often exceptionally large ficrons and cleavers found in MIS 9 assemblages (see above). Analysis of the broadly similar European *Micoquien* handaxes offers some limited support to the idea of resharpening into the plano-convex form Ashton (2002, 2008). Blaser and Chaussé (2016) described a small number of plano-convex handaxes from Middle Palaeolithic contexts (MIS 5e/d) at Saint-Illiers-la-Ville, northern France. They illustrated the reduction sequence for one large plano-convex handaxe, shown below in figure 9.12. Their interpretation suggested that the ventral (planar) surface was worked first, followed by the progressive reduction of the dorsal (convex) face; whether this constitutes ‘resharpening’ (in the sense of progressive use, retouch, and reuse) or whether the retouch was applied at the initial point of manufacture is unclear, however.

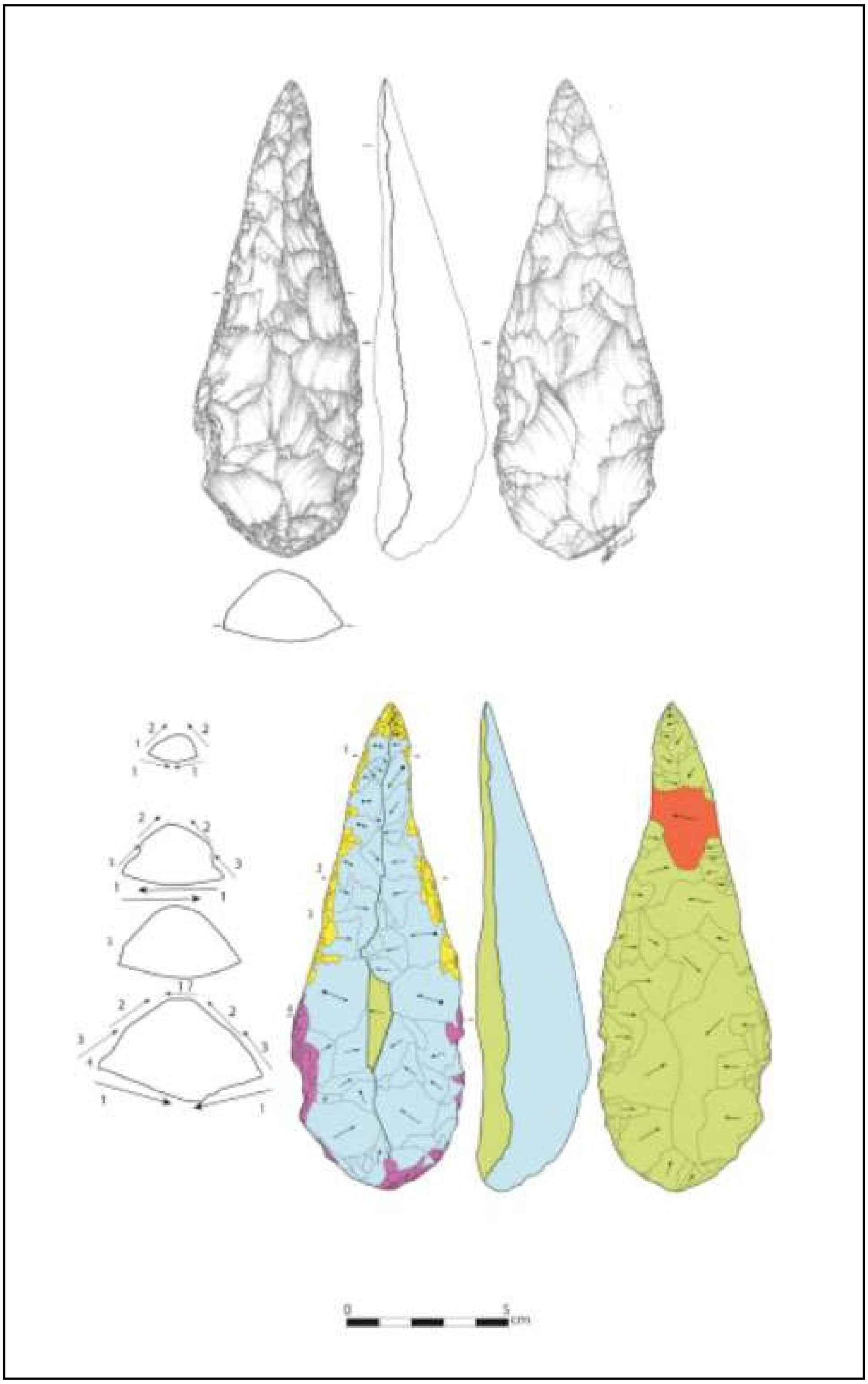


Figure 9.12. A large 'Micoquien' plano-convex handaxe from Saint-Illiers-la-Ville, France. The lower part of the image shows the reduction sequence, with the flat, ventral surface worked first (green) followed by the shaping of the convex dorsal surface (blue), with retouching of the edges (yellow and purple). This is not dissimilar to Ashton's suggestion for the shaping by progressive reduction of the Wolvercote plano-convex handaxes. Images after Blaser and Chaussé (2016), Figs. 7/8.

9.5.1. Wolvercote.

The position of Wolvercote in terms of metrical and typological grouping has so far remained unresolved and will therefore be addressed here with the preceding section on plano-convex handaxes and resharpening in mind.

The Wolvercote handaxe assemblage in its current state is probably not representative of the original archaeological contents of the Wolvercote Channel. Tyldesley (1986) noted that no archaeological excavation was ever undertaken, and that the artefacts were collected by pit workers prior to 1920. She suggested that the difficult working conditions – the pit was often waterlogged - may have led to smaller objects 'not immediately recognisable as artifacts' to be missed or ignored by the workers on account of their lower commercial value. A large and finely made handaxe might be sold for the equivalent of a gravel pit workers weekly wage, however, which probably led to the formation of a rarefied assemblage of finely made handaxes (Tyldesley 1986).

The lack of metrical cleavers in the Wolvercote handaxe assemblage is one of the key differences between Group I and Group III. This returns to the problem of the imperfect overlap between a metrical and typological cleaver; the present study did identify a single example of the latter, a type GH cleaver shown in figure 9.13. This handaxe is unusual, in that it appears to be a truncated pointed handaxe with a tranchet resharpened tip, but the transverse cutting edge clearly qualifies it as a cleaver. Tyldesley also illustrated examples which could certainly pass for typological cleaver variants, especially given that a wide variety of cleaver forms were seen at other sites. This at least suggests that the concept of a cleaver (and *tranchet* technology) was known to the handaxe makers.

Figure 9.13. A Wolvercote cleaver, formed from the tranchet resharpening of a truncated type F (pointed) handaxe. This shows that the idea of a cleaver was not unfamiliar to the Wolvercote handaxe makers, despite the generally low numbers of (metrical or typological) cleavers.

In summary, Wolvercote is different - but perhaps not different enough to justify a distinct morphometric group. It would perhaps be best regarded as another sub-group of the wider Group I pattern. It may rather represent another aspect of the extreme variability permitted within the culturally defined metrical preferences of Group I.

Roe's Groups have all been linked to specific MI stages, or sub-stages (as shown in figure 2.6). All the Groups *except Group III* were primarily morphometrically defined, which is to say that Roe was able to successfully identify common shape preferences from metrical indices alone (particularly planform, elongation and tip shape); these were *supported* by attribute evidence, such as the occurrence of twisted profiles and the frequency of *tranchet* removals, but the Groups had been established before this evidence was introduced (Roe 1968a). In purely metrical terms it can reasonably be suggested that Wolvercote aligns with Group IA based on its preference for pointed types and the general narrowness of the assemblage. The lack of metrical cleavers would be unusual for a Group IA site, but it should be borne in mind that a) the proportion of cleavers varies significantly between sites, b) there are a handful of objects with tranchet removals which could pass for typological cleavers even though they do not meet the metrical criteria (White 2006), and c) the assemblage could be interpreted as an activity area for only a handful of knappers in a relatively short time period (Tyldesley 1986), which might point to the production of task-specific tools. This may be compared to another atypical supposedly MIS 9 site, McIlroy's Pit, which showed an unusual preference for large, pointed types at the expense of other types (Wymer 1968). Simply put, the Wolvercote assemblage may have provided a snapshot of the more generic Group I culture which, at that time and in that place, had no need of cleavers.

Roe's addition of Wolvercote to Group III was predicated on the fact that the handaxes were somewhat narrower than Group I sites, lacked metrical cleavers, and were frequently plano-convex in profile. The extreme narrowness was not confirmed by this study, nor by data from Tyldesley (1986), Lee (2001), or White (*pers. comm*.). Plano-convex handaxes are nowhere near as abundant at other sites as at Wolvercote, but not entirely absent; Tyldesley (1986) catalogued known 'Wolvercote-type' plano-convex handaxes in UK museums, summarised in table 9.1. below. 'Wolvercote-type' handaxes were also independently identified at the supposed MIS 9 sites of Warsash (Davis et al., 2016), Red Barns (Gamble & ApSimon 1986; Wenban-Smith et al. 2000; Ashton 2008), Berinsfield (Lee 2001), Twydall (Beresford 2019), and Boscombe (Ashton 2008).

Table 9.1. A summary table showing 'Wolvercote type' plano-convex handaxes identified by Tyldesley (1986).

Area	Site	Number of convincing 'Wolvercote-type' implements.	Notes
Upper Thames	Berinsfield (SU 585592)	1	Shallow, delicate removals from the tip, greater intensity of working of the dorsal face, pronounced dorsal arete; 'definitely reminiscent' of the Wolvercote-type handaxes.
	Eynsham, Station Pit (SP 429088)	1	An isolated find from a pit on the Summertown-Radley terrace some 4.83km from Wolvercote and 'clearly made in the Wolvercote tradition'.
	Oxford, Summertown (c. SP 506090)	1 (plus one less convincing)	Found 1.61km from Wolvercote in the Summertown-Radley terrace deposits.

	Oxford, Summertown (North Rise) (c. SP 503106)	0 (but a possible continuation of the Wolvercote Channel deposits).	6 handaxes and 2 fragments were found here, in deposits Tyldesley suggested may represent a continuation of the Wolvercote deposits. None were plano-convex, however a ficron tip was found (a type absent from the Wolvercote assemblage).
Middle Thames	All Saints Avenue Pit (c. SU 875812)	2	From channel deposits cut into the Lynch Hill terrace, which Tyldesley interprets as showing a younger age than Furze Platt and Baker's Farm.
	Tilehurst, Kenwood Hill (c. SU 674741)	1	A poorly provenanced handaxe thought to have originated from Boyn Hill Terrace deposits. This handaxe features the plano-convexity and 'pyriform' shape of a 'Wolvercote-type' handaxe, but lacks the pronounced dorsal *arete*.
	Goring Heath (c. SU 657793)	1	Made on chert.
	Henley, Friar Park (SU 750827)	1	The only known find from the 'high level brickearth' of the Thames above Burnham, Bucks. Smith (1922) commented on its Micoquian attributes, whilst Wymer (1968) saw similarities with Wolvercote (a view shared by Tyldesley).
Solent	Bournemouth (general area including Boscombe and Christchurch) (c. SZ 086912)	14	These handaxes approached the classic 'Wolvercote-type' form without being 'exact parallels',

			according to Tyldesley.
	Chandler's Ford (SU 432207)	1	
	Romsey, Test Road (SU 375205)	1	Found within a mixed but point dominated assemblage.
	Southampton (general)	6 (unconvincing)	Tyldesley identified six unconvincing, slightly plano-convex handaxes from localities around Southampton, including one example from Highfield.
	Shirley Church (SU 399139)	1	
	Warsash (c. SU 498055)	At least 4	These were both unifacial and bifacial, and Tyldesley considered them convincing additions to the 'Wolvercote type'. These were first illustrated by Burkitt et al., (1939) and were reassessed by Davis et al., (2016).
	Quendon, Essex (TL 517307); Rhossili, Glamorgan (SS 414883); Bishops Stortford, Herts. (c. TL 493179); East Winch, Norfolk (c. TF 723163); Homersfield, Suffolk (c. TM 287855)	5 (1 from each site)	The remaining handaxes are from the east of England (and one from Wales), but Tyldesley was generally unconvinced by their 'Wolvercote-type' credentials.

The preference for plano-convex handaxes at Wolvercote, although unique in the number of handaxes produced to that form, is typical of the sort of inter-site variability observed across Group I whilst still adhering to the broad, overarching metrical preferences which appear to typify the MIS 9 interglacial across much of Britain. The geographical range of 'Wolvercote type' plano-convex handaxes is far more restricted than the distribution of plano-convex handaxes *sensu lato,* the latter presumably occurring due to accident in design or workmanship, selection of plano-convex raw material, or the manufacture of handaxes on flakes (Davis et al., 2016). Examination of Tyldesley's catalogue of 'Wolvercote-type' handaxes beyond Wolvercote itself shows a clear western skew to the distribution in Britain, with particularly prominent clustering in the former Solent catchment and the Upper Thames. This may suggest that the technique for producing such handaxes was regionally restricted.

Lee suggested that the manufacture of a pointed plano-convex handaxe at Berinsfield on local quartzite, rather than manuported flint, argued for the plano-convex shape being 'entirely the result of intentional behaviour under the tradition of the Late Acheulian or Micoquian style' (Lee 2001, 122). The findings of Shipton & White (2020) would appear to support this; they suggested that shape was largely determined by association with a specific site (i.e., was a culturally transmitted quality), rather than driven by, for example, raw materials or reduction intensity. A middle road may be suggested; the fact that plano-convex handaxes at Boscombe, Wolvercote and Red Barns appear to have been curated suggests that conservation of valuable raw materials was a factor in producing plano-convex handaxes (Ashton 2008). The occurrence of large flint ficrons (max. 194mm) and cleavers (max. 135mm) at Berinsfield (Lee 2001) suggests that imported flint was not necessarily *always* used to make pyriform plano-convex handaxes; it was rather a choice, which may have originally been borne out of the exigencies of a paucity of raw material but was ultimately part of a flexible cultural repertoire. 'Wolvercote-type' plano-convex handaxes also occurred alongside ficrons and cleavers at Warsash and Berinsfield, suggesting either that these sites represent mixed assemblages – a distinct possibility in both cases - or that the plano-convex handaxes formed a part of the larger MIS 9/ Group I tradition.

Analysis of the evidence from the proximal parts of Europe reveals a number of sites where comparable plano-convex handaxes occur, particularly the site of La Micoque and a handful of other sites in northern France. Tyldesley (1986) speculated on the possibility of a 'Western Micoquian' tradition but conceded that the perceived similarities could be 'pure coincidence'. Several of the sites where Tyldesley suggested some similarity to Wolvercote have been suggested as being MIS 9 age, but others date from as early as MIS 11 – 10 to as late as MIS 5e/d. This argues against a straightforward, chronologically restricted techno-cultural tradition (e.g., Tyldesley 1986; Gouédo 1999), although all the convincing occurrences are post-Anglian in age. This is summarised below in table 9.2.

Table 9.2. Recorded plano-convex handaxes in Europe; it should be noted that this list is intended to be illustrative rather than comprehensive, and is based on a review of literature rather than a thorough gazetteer.

Site	Abundance of plano-convex handaxes	Similar to Wolvercote?	Suggested age.	Key references.
La Micoque Layer VI, France	Moderate?	Yes, although smaller and with some	MIS 9 (Falguères et al., 1997).	Peyrony (1938); Bordes (1956); Callow (1976)

		differences in retouch.		
La Mare-aux-Clercs, France, Layer 9B	Low? Less than 5% of a mixed assemblage.	6 Wolvercote-like handaxes from a typologically mixed assemblage derived from several stratigraphic layers.	Co-occurring ficrons and cleavers in Layer B9 may suggest at least a partly MIS 9 assemblage, although it is unclear if the preference for ficrons and cleavers extends into Europe.	Bordes (1954); Callow (1976); Tyldesley (1986).
Moru, France	Low	2 convincing 'Wolvercote-type' handaxes	Latest Lower Palaeolithic (MIS 9 – 7) (Auguste 2009)	Patte (1924, 1975); Callow 1976)
Saint-Illiers-la-Ville, France, Layer N2	Low	'Micoquien' site with at least one large, well-made plano-convex handaxe approximating the 'Wolvercote-type'.	Layer N2 dated to MIS 5e/d (Debenham 2012; Blaser & Chaussé 2016)	(Blaser & Chaussé 2016)
Bockstein III, Germany	Low	Metrical similarities between the assemblages (point dominated, no cleavers), but Bockstein III handaxes are generally smaller, with more residual cortex, and no 'typical Wolvercote handaxes'.	Unknown, probably Middle Palaeolithic (Ruebens 2012, Richter 2016)	Wetzel & Bosinski (1969)
Campogrande Layer 9/10, Italy	High	32 plano-convex bifacial tools recorded, although these may	MIS 11 - 10	Moncel et al., (2020a)

		result from the use of flat cobble blanks.		
Colle Avarone, Italy	High	60 plano-convex Large Cutting Tools (LCTs).	MIS 11 - 10	Moncel et al., (2020a)
Selvotta, Italy	High	19 of 38 handaxes is plano-convex, some ‘retouched on the edges’ in a possible analogue for the ‘Wolvercote-type’.	MIS 11 - 10	Moncel et al., (2020a)

Whilst the evidence does not present a clear picture of plano-convex handaxes constituting a discrete cultural tradition, the techniques used to produce such handaxes may have been widely disseminated amongst latest Lower Palaeolithic (and later, Middle Palaeolithic) populations, employed as and when circumstances demanded.

9.6. Summary.

The difficulty of identifying resharpening on handaxes lacking differential patination makes addressing the impact of reduction on handaxe shape a speculative endeavour. Aside from the general criticisms of reduction hypotheses, and particularly McPherron’s resharpening hypothesis, reduction from points to ovates may be rejected in MIS 9 contexts if only because the handaxes are overwhelmingly pointed in planform. Resharpening may have been a factor in the production of certain of the distinctive types strongly associated with MIS 9 handaxe assemblages: the cleaver, ficron, and plano-convex handaxes. Whilst resharpening can be *suggested* in each case, clear evidence is limited to ovate or sub-cordate cleavers formed by *tranchet* removals, and the distinctive steep retouch observed on ‘Wolvercote-type’ plano-convex handaxes. The Wolvercote assemblage itself may be reappraised as part of a wider expression of Roe’s Group I rather than a distinct group, based on its similar metrical characteristics, the fact that it preserves only a ‘snapshot’ of behaviour, and the presence of plano-convex handaxes at other sites (albeit in smaller numbers).

Chapter Ten: The Lower – Middle Palaeolithic Transition.

10.1. Introduction.

Can the data and interpretations presented in the preceding chapters be integrated into the evolving narrative of a complex, prolonged Lower – Middle Palaeolithic transition? Much of the previous research into this key period, which represents the first significant, stable advancement in technology for over a million years, has focussed on the replacement of the handaxe by Levallois technologies. The recent work of Aaron Rawlinson (2021) and others (e.g., Herrison et al., 2016a, 2016b; Picin 2018) have shown that Levallois technology probably emerged at multiple points in time in multiple locations, being immanent in Acheulean technology (Bordes 1971; White & Ashton 2003; White et al., 2006; Moncel et al., 2020b), before becoming more permanently established across Europe between MIS 9 – MIS 7 (White et al., 2011; Moncel et al., 2011). Rather than an abrupt change, this may be viewed as a transitional process; the unusually long, continuous archaeological record at Orgnac 3, France, shows that the relative proportions of Levallois and handaxes changed over time with 'residual' handaxes appearing after the Lower – Middle Palaeolithic transition (Moncel et al., 2011). What is less clear, is whether changes can be detected in the British MIS 9 handaxes in this transitional period. The following chapter will briefly summarise the conclusions reached by Rawlinson (2021), before presenting a suggested chronology for MIS 9 based on both handaxe and non-handaxe signatures. It will then assess how key features of Middle Palaeolithic behaviour – particularly the emergence of highly localised cultures, and increased diversity in toolkits – can be related to the MIS 9 handaxe assemblages studied. It will conclude with a brief review of the Lower – Middle Palaeolithic transition in Britain and Europe.

10.2. Non-handaxe MIS 9 techno-complexes.

MIS 9 is unique in the British record, in that it saw a tripartite succession of lithic industries; the Clactonian, Acheulean and Levallois technologies. This thesis has focussed exclusively on the handaxe component of the Acheulean; the non-handaxe assemblages, flake-tools and Levallois components were studied by Rawlinson (2021). The integration of his findings with the present research are crucial, both in establishing an internal chronology for MIS 9 and in charting the Lower – Middle Palaeolithic transition in Britain.

Non-handaxe industries.

Rawlinson verified only a handful of non-handaxe sites, all confined to the south-eastern region of Britain, having rejected or queried a number of other sites which had previously been posited as

Clactonian. He noted the similarity between the MIS 9 and MIS 11 Clactonian material, although did not believe a ‘direct connection’ between the two was necessarily indicated. Rawlinson considered the British Clactonian to be a primarily cultural expression, part of a wider pattern of non-handaxe assemblages across Europe.

Flake tools.

An increase in flake tools during MIS 9 had previously been suggested (Pettitt & White 2012; White & Bridgland 2018), but this was rejected by Rawlinson (2021; Rawlinson et al., 2021), who suggested that numbers of flake tools had been over-estimated in previous evaluations. Flake tools formed part of the Acheulean toolkit, with some convergent examples grading imperceptibly into flake-handaxes; Rawlinson found no overt link between flake tools and either Clactonian or proto-Levallois assemblages, nor did he establish and spatial or temporal patterning in the occurrence of flake tools.

Prepared core technology (proto-Levallois and developed Levallois).

Rawlinson confirmed the presence of prepared core technologies across southern Britain in MIS 9, but noted that the type-site at Botany Pit, Purfleet remained by far the largest assemblage. He noted that proto-Levallois material was associated with Acheulean archaeology, to some degree confirming the suggestion that simple prepared core technology is immanent within handaxe manufacture (as previously suggested by Bordes (1971b) Tuffreau (1995), Rolland (1995), White and Pettitt (1995), White & Ashton (2003) and others).

Perhaps most significantly, and in agreement with the mosaic pattern of Lower-Middle Palaeolithic transition established in Europe, Rawlinson considered the inception of fully developed Levallois technology in MIS 8/7 to be a ‘separate phenomenon’ from the earlier expressions of prepared core technology; this later version of Levallois did not coexist with handaxes but replaced them, at least in Britain. Rawlinson used this evidence to suggest that prepared core technologies had multiple points of origin across a wide geographic and chronological range, although he rejected suggestions (e.g., by Wenban-Smith 2013) that prepared core technologies were a significant feature of the Lower Palaeolithic technological repertoire prior to MIS 9.

10.3. An integrated view of the MIS 9 technocomplexes.

White & Bridgland (2018) presented two possible interpretations of the internal chronology of MIS 9, using the key sequence at Purfleet as the core of their frameworks. Their compressed chronology equated the Purfleet deposits (and by extension, much of the correlated archaeological record from MIS 9 Britain) with the peak interglacial stadial sub-stage (MIS 9e); in this scenario, the Botany

Gravel represented the cooling MIS 9e – 9d transition, and the proto-Levallois technology contained within was therefore a relatively early occurrence. The rest of MIS 9 (9d – MIS 8) was either unrepresented in the archaeological record or was represented by anomalously 'late' handaxe sites such as Harnham or Wolvercote.

Their long chronology equated the Botany Gravel, and thus proto-Levallois technology, with late MIS 9 (possibly arriving or appearing in Britain at MIS 9b, following Westaway et al., 2006). In this chronology, the Acheulean followed the Clactonian in MIS 9e and endured until the end of the interglacial (and possibly beyond).

An adaptation of White & Bridgland's long MIS 9 chronology is shown below in figure 10.1, modified to include both the suggested temporal patterning for MIS 9 morphometric sub-groups in the east, and the possible differences between the east and west in terms of the duration of the Acheulean in Britain. The approximate timings of non-handaxe technologies are also shown.

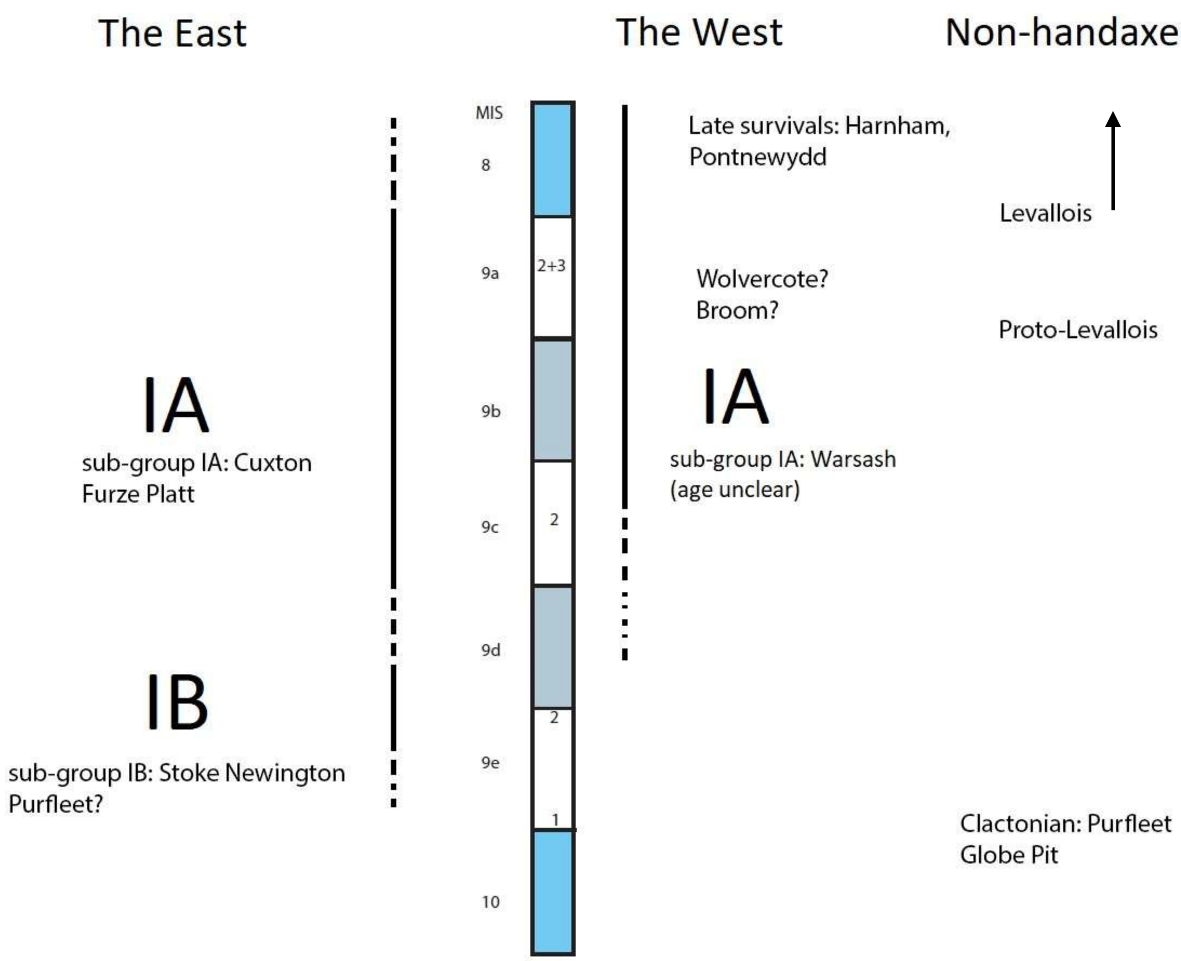


Figure 10.1. An interpretation of the sub-MIS chronology of MIS 9, using White & Bridgland (2018), Fig. 6 as a starting point. This interpretation places the Group I sub-group (IB) at MIS 9e based on the dating of Stoke Newington; the dating of sub-group IA is less secure, based in part on the (speculative) dating of the main gravel spreads of the Middle Thames Lynch Hill terrace having formed at the MIS 9/8 transition, although sites such as Cuxton suggest a later rather than earlier date. There is no representation of the Clactonian or sub-group IB in the west; sites such as Warsash align with sub-group IA, but it is unclear which part of MIS 9 they relate to. Sub-group IA may have survived into MIS 8, and perhaps even later, in the west. The seemingly unique western sites at Wolvercote and Broom are also likely to belong to the later part of the interglacial. The non-handaxe signatures are mostly based on evidence from the south east of Britain; the inception of proto-Levallois technology may not have been a single event, and may not have occurred simultaneously across Britain.

10.4. Regionalisation.

Cultural regionalisation is a key characteristic of the Late Middle Palaeolithic (Ruebens 2013; Galway-Witham et al., 2019) and a less visible part of the Early Middle Palaeolithic (e.g., Wisniewski 2014; Picin 2018; Mathias et al., 2020), but regionalisation was evident in the Britain and Europe from as early as MIS 11 (Ashton 2018; Pereira et al., 2018; Ashton & Davis 2021; Blain et al., 2021). Regionalisation (i.e., spatial or geographical patterning) has not previously been robustly identified in MIS 9 Britain, although it has been tentatively suggested (White & Bridgland 2018).

The more generalised industries reported from some sites in the Solent may be indicative of the kind of spatial patterning representative of local cultural practises. This may be confidently suggested for

Broom, and perhaps for Highfield; it is less certain at the other Group IV sites, which could well appear generalised due to vertical mixing rather than cultural preferences. The occurrence of plano-convex handaxes of the 'Wolvercote-type' appears to be skewed towards western Britain also, particularly at Wolvercote; whether this can be considered as representative of a distinct cultural group, or just a task or raw-material specific expression within the wider Group I preference (perhaps conditioned by the exigencies of having to import high quality raw material) cannot be established here, although the present author would lean towards assigning Wolvercote to a sub-group of Group I (sub-group IC) rather than its own distinct Group (Group III). The possible late survival of handaxe cultures (probably of the Group I morphological preference) into MIS 8/7 might point to a regional division between the predominantly Levallois dominated east and residual handaxe making cultures in the east.

The morphometric sub-groups IA and IB may also be spatially patterned, with sub-group IB confined to the London area (and less securely, the Great Ouse) and sub-group IA with a much wider geographical distribution across southern Britain. However, it is argued here that this patterning is chronological, with sub-group IB representing an earlier Acheulean group which either mutated into sub-group IA over time or was replaced by a succeeding colonisation wave. In this, both the geographic distribution (in the far east of southern Britain) and temporal occurrence (prior to, or synchronous with, the peak interglacial conditions at MIS 9e) may be compared to the distribution of Clactonian sites in Britain (e.g., Whymer 1968; Rawlinson 2021), perhaps suggesting only a limited duration. It could be suggested in turn that the small, crude sub-group IB handaxes could themselves have emerged autochthonously from Clactonian colonist groups, who themselves made occasional crude 'non-classic' handaxes (Ashton & McNabb 1994). To the eyes of the present author, at least, there is very little difference between the small crude handaxes of the Group IB 'Stoke Newington-type' and these 'non-classic' handaxes (example in figure 10.2.), except that they form a very large proportion of the Stoke Newington assemblage and only a very small part of Clactonian assemblages (Conway 1996; White 2000; Ashton & McNabb 1994; Pettitt & White 2012).

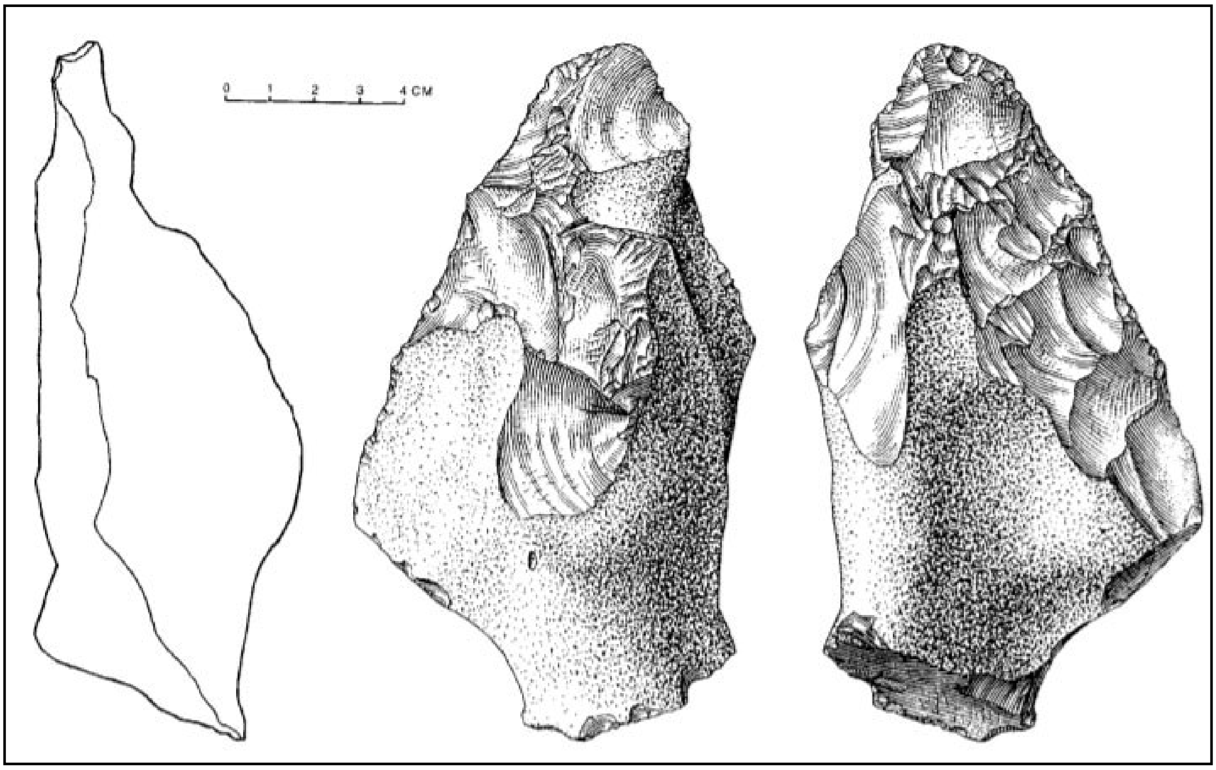


Figure 10.2. An example of a 'non-classic biface' from Swanscombe, from McNabb (1996) Fig. 6, p.435.

The relatively low number of Clactonian MIS 9 sites and the poor chronological resolution of MIS 9 sites in general makes this a hard hypothesis to test.

10.5. Diversification.

The Middle Palaeolithic was originally characterised by Breuil as a period of technological stability and was relatively uniform across its temporal and spatial span (Delagnes & Meignen 2006). In this, it may be compared to enduring but changing view of the Lower Palaeolithic as a period of 'cultural stasis'. The reappraisal of Middle Palaeolitic sites and assemblages in Europe now points to a diversification in tool types, particularly those produced by standardised debitage processes such as the Levallois method (Delagnes & Meignen 2006; Wisniewski 2014; Carmignani et al., 2017; Mathias et al., 2020). Assemblages with Levallois technology combined with specialised bifacial tools (plano-convex handaxes, asymmetrical bifacial tools), are typical of elaborations in technology characteristic of the Middle Palaeolithic (particularly the Late Middle Palaeolithic) (Moncel et al., 2011; Mathias et al., 2020).

Wenban-Smith (2004) suggested that the intra-site diversity of handaxe types increased throughout the Lower Palaeolithic, which could represent a plausible antecedent for this bloom in technological diversity after the Lower – Middle Palaeolithic transition. The present study was able to confirm, or at least strongly support, the previously suggested chronologically restricted pairing of ficrons and cleavers; it can now also be reasonably suggested that hypertrophy was also chronologically restricted to MIS 9 in Britain, barring a few isolated pre-Anglian examples of giant handaxes. The application of prehensile features to handaxes may also have been more prevalent in MIS 9 than in previous interglacials. A more general indication of high diversity in form might be suggested from the wide spread of morphometric data (now divisible into two sub-groups, IA and IB) and from the occurrence of highly generalised industries in the southwest, particularly at Broom. The increased diversity in symmetry recorded in previous studies and broadly confirmed here might also suggest a departure from strict 'mental templates' towards greater flexibility in both design and execution.

Arguably these occurrences *do* suggest an increasing diversity in type and form, although whether this could be extended to argue for separate *formal* tool types is less clear; it seems reasonable to suggest that a cleaver might be a completely different tool in functional terms than a ficron, but this must be balanced against the fact that all handaxe types tended to grade imperceptibly into one another and there is scant experimental evidence to support different uses for different types.

The evidence from the non-handaxe technological components of MIS 9 supports diversification insofar as the tripartite succession of technological modes is unique, but this should be balanced against the fact that Rawlinson (2021; Rawlinson et al., 2021) identified few changes in either the character or numerical representation of flake tools through the Lower Palaeolithic.

10.6. Backing.

Moncel & Ashton (2018) noted that distinctions between volume and the prehensile qualities of handaxes became apparent in the post-Anglian Lower Palaeolithic. This contrasts with earlier Lower Palaeolithic handaxes where active and ergonomic parts of the handaxe were essentially unified by the imposition of symmetry (as discussed above). The attention paid to prehensile properties might be interpreted as presaging the Middle Palaeolithic, where a clear distinction was created between active (cutting) edges and prehensile parts of the tool (Moncel 1995; Soressi & Hays 2003; Moncel & Ashton 2018).

The prevalence of backing in various forms in the MIS 9 handaxes studied can be compared to the 'Quina/ Yabrudian 'pattern'' (Kuhn 2013). This term refers to the preference for cortical or blunted margins opposing cutting edges on large flakes and bifaces in the late Lower Palaeolithic Levantine Yabrudian industry (e.g., Zaidner & Weinstein-Evron 2016), and the occurrence of similar features much later Middle Palaeolithic (MIS 4) on flake tools produced by the stepped, invasive *Quina* technique in western Europe (e.g., Turq 2000). The c. 200ky time gap between the two industries, not to mention their geographical separation, argues against direct cultural transmission linking the two (Kuhn 2013); they are perhaps better regarded as similar solutions to the same problem, discovered at different times (which itself may be compared to the repeated reinvention of Levallois technology, e.g., White & Ashton 2003). Likewise, the Middle Palaeolithic CEEM included cortically backed implements (Matskevich et al. 2001; Joris 2006; Wiśniewski et al., 2020). The crude cortical backing, macroscopic asymmetry and oblique (knapped) backing observed on a small but significant fraction of the MIS 9 handaxes assessed in the present study might be presented in the same way: as an independently invented means of producing an ergonomically functional area of the tool which can comfortably transmit a greater amount of force to a cutting edge.

10.7. A long transition.

The view of the Lower – Middle Palaeolithic transition as an elongated process, potentially with roots extending into MIS 11, is becoming increasingly accepted (e.g., Moncel & Ashton 2018; Arzarello & Moncel 2021). Moncel & Ashton (2018) linked this development with the establishment of more permanent populations in Europe following the Anglian glaciation, leading to the development of local traditions. They noted the increasing elaboration of handaxes in the post-Anglian, citing the occurrence of 'twisted' ovates (White 1998; White et al., 2019) and elongate ficrons (Wenban-Smith 2004; Bridgland & White 2014, 2015, 2017, 2018; White et al., 2018). McNabb & Cole (2018) proposed a 'punctuated long chronology' to describe the four key phases in the Pleistocene hominin occupation of Europe. The last of these stages occurred 500 – 300 kya., which they linked to a significant 'species-wide level' increase in behavioural plasticity which allowed hominins to thrive in cooler northern latitudes, where they had previously only been visitors. This plasticity was marked by an increase both in handaxe assemblage size and distribution, and by a suite of what they considered to be associated cultural behaviours including fire-use (Gowlett 2006; Roebroeks & Villa 2011), and more frequently preserved organic artefacts at sites such as Clacton (Warren 1922) and Schöningen, Germany (Richter & Krbetschek 2015; Van Kolfschoten et al., 2015). The suggested post-Anglian (MIS 11 onwards) increase in plasticity may also be evident in the habitation of more arid environments in the Iberian Peninsula than had previously been viable to hominins (Blain et al., 2021). Roebroeks (2001) and Gamble (2009) both argued that the post-Anglian period was marked by an expansion in hominins in northern Europe, along with increased encephalisation which resulted in changes in both group sizes and social behaviour, both of which provided advantages in terms of co-operative hunting strategies. McNabb & Cole (2018) tentatively suggested that the post-Anglian behavioural shift may have been related to the genetic origins of the Neanderthal at c. 430 kya., based on the palaeogenetic timings in Meyer et al. (2016). The wider post-Anglian pointed handaxe tradition (Roe's Groups I, II and III) postulated by the present study may also coincide with these suggested changes; the great diversity in type and form in MIS 9 handaxes, including an increased attention paid to prehensile properties, may also be mapped onto a general increase in behavioural plasticity and innovation (Arzarello & Moncel 2021).

The transition from handaxe dominated assemblages to Levallois dominated assemblages (the key technological marker for the Lower – Middle Palaeolithic transition) did not occur in lockstep globally; rather, there is evidence for regional trajectories of change which occurred at different times and with different durations (McBrearty & Tryon 2006; Van Baelen 2017; Moncel et al., 2012, 2020b). Shipton (2016) summarised the timings of the transition in different parts of the world: in north western Europe MIS 8 is generally regarded as the turning point (White & Ashton 2003; Scott 2010), but the build up to the technological transition may have its roots as deep as MIS 11 in parts of Europe such as Italy, indicated by the occurrence of convincing Levallois technology at the site of Guado San Nicola (Kuhn 2013; Peretto et al., 2016; Soriano & Villa 2017); the ultimate replacement of handaxes in Italy is placed somewhat later than in north-western Europe at the end of MIS 7 (Picin et al., 2013). Likewise, the Iberian transition may have been particularly drawn out, with handaxe assemblages persisting alongside newer technological modes from MIS 9 almost until MIS 5e (Santonja & Villa 2006; Rios-Garaizar et al., 2011; Méndez-Quintas et al., 2020). The Levantine transitional period was marked by a transitional industry, the Acheuleo-Yabrudian industry, which was ultimately replaced by Levallois technology in the Levant around MIS 8 (Goren-Inbar 2011; Malinksy-Buller 2016).

10.8. Summary.

That handaxes were ultimately supplanted by Levallois technology as the mainstay of cutting technology is undeniable although the timing and duration of this replacement is still debated, and it is merely the most visible aspect of a suite of behavioural changes heralding 'Neanderthalisation'. Levallois technology represented a versatile, portable functional replacement for the handaxe (Scott 2010). Given that handaxes are widely considered to have resonated with a social 'meaning' which is not generally associated with Levallois tools, it is possible that intangible, archaeologically invisible aspects of hominin culture came to the fore during and after the Lower – Middle Palaeolithic transition. The increase in the prevalence of asymmetrical functional areas on handaxes in the latest Lower Palaeolithic might suggest a loosening of the social and cultural significance of the handaxe in advance of the Lower- Middle Palaeolithic transition, although it should equally be acknowledged that highly symmetrical, giant handaxes were being produced at the same time which very likely *did* have some sort of social or cultural significance.

Evidence of spatial patterning, particularly between the east and west of southern Britain, and speculative temporal patterning between an earlier and later expression of the Group I handaxe morphological preference, show both a continuity with MIS 11 (where such features were also identified), and perhaps herald the increased localisation and formation of a ‘mosaic’ of cultures in Middle Palaeolithic Europe.

Chapter Eleven: Conclusions.

11.1. Introduction.

The preceding thesis attempted to expand our understanding of handaxe morphology, typology and technology at the latest Lower Palaeolithic (MIS 9) in Britain. By identifying and analysing historical artefact collections from both 'flagship' and less-well attested sites, the handaxes of MIS 9 Britain were characterised over a large spatial (and potentially chronological) range. The results of this study add to a growing understanding of MIS 9 Britain, and of the wider Lower – Middle Palaeolithic transition in Europe. The key findings of this study are briefly summarised below:

- Expected patterns are present (widespread Group I, ficrons and cleavers), but with a wider range of variability of shape from site to site; sub-groups were identified within Group I for the first time.
- Group IA was geographically widespread; Group IB was confined to the east of England, particularly around London. Sites such as Wolvercote and Grovelands Pit only provide behavioural 'snapshots' – they may well reflect regional patterns, but it is difficult to say for sure. Broom may be a unique 'generalised' assemblage, or may relate to other 'generalised' assemblages in the west (although many of these assemblages could be vertically mixed).
- Chronological patterning can be confirmed at the MIS scale, and some sort of continuity from MIS 11 – 9 (and perhaps from 9 – 7) can be suggested based on the similarity between Roe's Groups I and II.

11.2. Spatial patterning.

Clear geographical patterning was elusive, but several possible examples were tentatively suggested. The first was a distinct Western handaxe group centred on the Solent, as previously suggested by Wenban-Smith (2001). These sites are characterised by highly 'generalised' assemblages including pointed, ovate, cleaver and ficron handaxes, aligning with Roe's Group IV (Roe 1968a). There is a strong suggestion that certain of these assemblages may be the product of inter-period mixing, however, which may have produced a false signal. Broom, a site where the handaxe assemblage is certainly convincingly different to the classic Thames sequence (Hosfield et al., 2013a, b, c), may be the most robust example of a distinct Solent culture, although it should also be noted that 'typical' Group I assemblages were also identified in the Solent, particularly at Warsash and Milford Hill. The south-west of Britain may also have a higher incidence of plano-convex handaxes (Ashton 2008;

Davis et al., 2016), although whether these constitute a distinct morphometric Group (III), another sub-group (IC) or simply a part of the 'standard' Group I toolkit is less clear.

Southern Britain outside of the Solent generally confirmed the expected patterning, in that sites generally aligned to Group I metrical preferences, and generally had ficrons and cleavers (Bridgland & White 2014, 2015, 2018; White 2015; White & Bridgland 2018). This overarching commonality masks a great deal of inter-site variability. In some cases, such as the possible preference for large cleaver handaxes at several East Anglian sites, this may represent smaller scale (sub-regional) geographical patterning. The identification of two metrical sub-groups (sub-group IA and IB) also suggested geographical patterning, as the smaller, broader and cruder handaxes of sub-group IB appeared to be clustered around London and the Lower Thames, and at two of the three Great Ouse sites; the Middle Thames, East Anglia, the Medway and Kentish Stour, and parts of the Solent were all characterised by the generally larger, narrower handaxes of Group IA. Whilst it was considered that these patterns may reflect genuine spatial patterning, alternative explanations were also considered including the impact of raw materials, collectors bias and overprinted chronological patterning.

11.3. Temporal patterning.

Chronological patterning at the MIS (decamillennial) scale was found to be broadly consistent with expectations at most sites, with a clear preference for Roe's Group I (albeit in an expanded metrical range to incorporate two sub-groups) across most geographical areas. Pointed handaxes generally dominated sub-Group IA, and ficrons and cleavers were a small but significant part of most assemblages; sub-Group IB had many of the same features, but a much higher representation of small, crude handaxes. The two most distinctive assemblages (Broom and Wolvercote) were both likely to have formed later in the interglacial, although whether unusual features at single sites can be said to constitute a 'pattern' is debateable; Broom may simply be a Group IV site with a high proportion of lopsided handaxes, and Wolvercote a Group I site with a high proportion of plano-convex handaxes. There is also the risk that sites which provide only a 'snapshot' in time and space, such as Wolvercote, do not represent the full range of behaviours practised by a group, and may therefore be less suitable for comparison with large secondary assemblages such as Furze Platt and Stoke Newington.

In addition to ficrons and cleavers, which had long been suggested as types chronologically restricted to MIS 9 (when co-occurring), the present study has presented evidence that hypertrophic 'giant' handaxes, such as the famous Furze Platt and Cuxton 'giants', may also be a temporally restricted feature.

Sub-stage chronological patterning was tentatively suggested as an explanation for the perceived differences between the sub-Groups IA and IB. This was based on the dating of Stoke Newington (Group IB) to the earlier part of the interglacial (MIS 9e), and of Cuxton (Group IA) to the later part of the interglacial. The possibility that the bulk of the Middle Thames Lynch Hill terrace was also emplaced late in MIS 9 also supported this suggestion, as the Middle Thames sites align closely with Group IA. One possible explanation for this suggested patterning is the differential preservation of Phase 2 gravels of the climatically driven terrace model in the lower reaches of the Thames, which switches to the differential preservation of the Phase 5 gravels in the middle and upper reaches; this suggestion remains to be validated by field-base evidence and may be hard to establish where the intervening Phase 3 deposits are absent.

At larger scales, it is possible to suggest a hundreds-of-thousands of years tradition extending from MIS 11 to at least MIS 9, and perhaps even to the anomalously late expressions of the Acheulean in MIS 8 and MIS 7. This pointed tradition, to use Roe's original classification, includes Groups I, II and III. The newly identified Group IB is something of a bridge between Group I and II, as it overlaps with Group II in terms of elongation (one of the key distinguishing indices in Roe's sorting methodology). More general similarities between Group I and II have been previously noted (e.g., by McNabb 2007), based on the preference for pointed types, often with unworked or partially worked butts, in both groups.

11.4. Prehensile features and resharpening.

A number of technological features were identified which could be described as prehensile or ergonomic; these features were aligned either directly or obliquely opposite a cutting edge and were generally found toward the butt. They often resulted from the preferential retention of cortex in useful areas, or else through the imposition of simple 'backing' by the blunting of an edge through bold removals. Macroscopically asymmetrical 'lopsided' handaxes, such as those found commonly in the Broom assemblage, have also been suggested as having prehensile properties.

Gauging the levels of these technologies in MIS 9 assemblages was difficult, as their identification was highly subjective, but it seems likely that they occurred in moderate proportions across all sites. It cannot be directly demonstrated that such technologies were chronologically restricted to MIS 9, however a comparison of technological proxies for reduction intensity – particularly the proportion of fully-worked butts, all-round worked edges, and per-centages of retained cortex – strongly suggest that such features were less common before MIS 9, and distinctly rare before MIS 11. Given that functional prehensile areas often result in planform asymmetry, it might be suggested that they represent 'function over form' and could feasibly explain the apparent reduction in handaxe symmetry in the British MIS 9 record as identified in previous large-scale symmetry studies, and the present work.

Identifying resharpening in cases where differential patination was not evident was difficult; it also seems likely that such cases where differential patination was evident were ‘recycled’ rather than resharpened. Suggestions that pointed handaxes were routinely or systematically resharpened into ovates can be robustly rejected, at least in the case of MIS 9 assemblages where pointed handaxes were dominant anyway. Three specific chronologically restricted cases were examined: the cleaver, ficron and plano-convex handaxe. The application of *tranchet* removals to large ovate and sub-cordate type handaxes resulted in transitional cleaver types (types HK and GK respectively), but fan-shaped and square sided cleavers seem unlikely to be the result of resharpening, regardless of the application of *tranchet* removals. Ficrons could conceivably represent the progressive resharpening of (normally very large) pointed types through the reduction of width whilst maintaining length. This is supported by comparing tip refinement between ficrons and pointed types, and by the fact that the degree of edge concavity is distinctly variable. Plano-convex handaxes are perhaps the most convincing possibility for resharpening. It has been suggested that the removal of flakes from the margins of the dorsal face might result in an exaggerated convexity in profile. This has been suggested to be an economising measure, as the sites where such handaxes make up a significant proportion of the assemblage – particularly Wolvercote – are situated in flint-poor areas. Whilst these three examples are at least possible examples of resharpening, recent multivariate statistical analysis has strongly suggested that handaxe morphology is more strongly determined by normative social tradition rather than resharpening or raw material availability (Shipton & White 2020).

11.5. The Lower – Middle Palaeolithic transition in Britain and Europe.

The delineation between the Lower and Middle Palaeolithic is based on the appearance of Mode 3 (Levallois) technology in the archaeological record, but the Lower – Middle Palaeolithic transition (and the associated process of ‘neanderthalisation’) is now widely understood to be a drawn-out period of change after the long, relatively stable dominance of the Acheulean in the Lower Palaeolithic. The seemingly sudden replacement of handaxes with Levallois technology in Britain is probably as much a relic of the settlement history of the area (characterised by periodic colonisation, extirpation and recolonisation by new groups); the picture in Europe, formed from studying key ‘long sequence’ sites such as Orgnac 3, shows a more graded replacement. In addition, the recent work of Rawlinson (2021) points to an earlier genesis for proto-Levallois and Levallois technology in Britain in MIS 9, perhaps the result of local *in situ* innovation in multiple areas and at multiple times (as suggested by Bordes (1971), and others).

11.6. Directions for future work.

Resolving the timing of the emplacement of the main body of the Lynch Hill terrace in the Middle Thames would be particularly instructive in terms of validating, or disproving, the suggestion that handaxes progressed from smaller, cruder forms at the beginning of the interglacial into larger and more finely made forms later in the interglacial. Whilst it may be too much to hope for new sites to be discovered to provide this evidence, the possibility of applying novel chronostratigraphic dating methods (e.g., OSL, ESR) to old sites is a potentially valuable avenue of investigation (Dale et al., 2021). Equally, confirming the 'early' credentials of the Stoke Newington handaxe assemblage would go a long way to supporting or disproving the apparent sub-stage chronological patterning in MIS 9.

Beyond finding new sites, casting the net even wider in terms of historical artefact collections could be extremely helpful in better defining possible patterning. In particular, key assemblages which were inaccessible for the duration of this doctoral study (e.g., Whitlingham, Southacre) would be valuable targets for future investigation. The question of whether the generalised Group IV signature in the Solent is genuine, or simply an artefact of inter-period mixing, could be more firmly established through an analysis of more Solent sites (including a full typological and taphonomic analysis of Bemerton, Woodgreen and Milford Hill).

Finally, the need to assess both British and proximal European sites using a common methodology is acknowledged, in line with the goals of the Western European Acheulean Project (Garcia-Medrano et al., 2020). The present study necessarily followed established *British* methodologies in order to facilitate meaningful comparison with older work on British sites; the next step would be to reanalyse these assemblages using a cross-compatible methodology, which might allow the extension of Roe's morphometric groups onto the Continent for the first time.

11.7. Concluding remarks.

The work above, and the companion project recently completed by A. Rawlinson (2021) have elucidated key features of the archaeological evidence from MIS 9 in Britain. Several important characteristics which had previously been suggested – an affinity for Roe's Group I, the co-occurrence of ficrons and cleavers, and a general increase in technological and typological diversity – can all be confirmed with some confidence. Several novel features, including the presence of morphometric sub-groups within Group I, and a chronologically restricted significance for 'giant' and backed handaxes, can also now be suggested. Whilst uncertainty remains regarding the relationship between the British and European handaxe record, certain key similarities have now been identified.

APPENDIX I - DATA

Site	Museum	Location reference.	Collection	Type	Condition	L (mm)	B (mm)	T (mm)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Aylesford	BM	1E30/25.1	Wellcome	F	very rolled	133	72	47	23	32	69	12	42	0.65	0.54	0.17	p	0.46	0.29
Aylesford	BM	1E30/25.2	Wellcome	DF	very rolled	213	116	59	57	52	107	37	44	0.51	0.54	0.27	p	0.49	0.84
Aylesford	BM	1E30/24.1	Wellcome	F	very rolled	127	89	44	25	38	88	23	34	0.49	0.70	0.20	p	0.43	0.68
Aylesford	BM	1E30/24.2	Wellcome	H	rolled	101	72	31	68	65	57	20	20	0.43	0.71	0.67	c	1.14	1.00
Aylesford	BM	1E30/24.3	Wellcome	K	very rolled	84	67	25	47	48	53	15	18	0.37	0.80	0.56	o	0.91	0.83
Aylesford	BM	1E30/24.4	Wellcome	GK	rolled	106	58	33	52	39	49	16	25	0.57	0.55	0.49	o	0.80	0.64
Aylesford	BM	1E30/24.5	Wellcome	K	very rolled	101	56	24	41	41	40	16	17	0.43	0.55	0.41	o	1.03	0.94
Aylesford	BM	1E30/24.6	Wellcome	FM	rolled	101	80	31	25	33	79	16	22	0.39	0.79	0.25	p	0.42	0.73
Aylesford	BM	1E30/24.7	Wellcome	FG	slightly rolled	111	60	33	40	39	50	21	25	0.55	0.54	0.36	o	0.78	0.84
Aylesford	BM	1E30/23.1	Wellcome	F	very rolled	170	100	45	40	50	87	18	40	0.45	0.59	0.24	p	0.57	0.45
Aylesford	BM	1E30/23.2	Wellcome	DF	very rolled	110	63	26	44	33	57	14	21	0.41	0.57	0.40	o	0.58	0.67
Aylesford	BM	1E30/23.3	Wellcome	M	slightly rolled	125	83	37	33	25	80	10	28	0.45	0.66	0.26	p	0.31	0.36
Aylesford	BM	1E30/23.4	Wellcome	FM	rolled	150	76	44	38	31	73	19	42	0.58	0.51	0.25	p	0.42	0.45
Aylesford	BM	1E30/23.5	Wellcome	K	rolled	84	59	33	38	37	47	16	25	0.56	0.70	0.45	o	0.79	0.64
Aylesford	BM	1E30/23.6	Wellcome	JK	slightly rolled	106	84	20	40	54	73	15	21	0.24	0.79	0.38	o	0.74	0.71
Aylesford	BM	1E30/22.1	S.H. Warren	F	rolled	106	65	31	23	33	56	14	29	0.48	0.61	0.22	p	0.59	0.48
Aylesford	BM	1E30/22.2	S.H. Warren	DF	rolled	104	64	39	26	39	59	13	32	0.61	0.62	0.25	p	0.66	0.41
Aylesford	BM	1E30/22.3	S.H. Warren	FM	rolled	137	64	31	26	22	64	8	28	0.48	0.47	0.19	p	0.34	0.29

Aylesford	BM	1E30/21.1	S.H. Warren	E	very rolled	88	60	22	30	39	52	14	17	0.37	0.68	0.34	p	0.75	0.82
Aylesford	BM	1E30/21.2	S.H. Warren	EF	very rolled	81	68	27	19	28	58	13	21	0.40	0.84	0.23	p	0.48	0.62
Aylesford	BM	1E30/21.3	S.H. Warren	FG	very rolled	137	87	30	44	36	71	14	23	0.34	0.64	0.32	p	0.51	0.61
Aylesford	BM	1E30/21.4	S.H. Warren	H	rolled	121	83	36	77	72	69	15	21	0.43	0.69	0.64	c	1.04	0.71
Aylesford	BM	1E30/21.5	S.H. Warren	DF	very rolled	110	76	34	30	38	74	15	33	0.45	0.69	0.27	p	0.51	0.45
Aylesford	BM	1E30/21.6	S.H. Warren	F	rolled	175	99	46	56	52	86	23	34	0.46	0.57	0.32	p	0.60	0.68
Aylesford	BM	1E30/19.1	A.T. Todd-White	HK	slightly rolled	123	86	35	81	72	76	19	20	0.41	0.70	0.66	c	0.95	0.95
Aylesford	BM	1E30/19.2	A.T. Todd-White	HK	very rolled	91	67	33	51	43	52	15	21	0.49	0.74	0.56	c	0.83	0.71
Aylesford	BM	1E30/18.1	W.A. Sturge	JK	rolled	107	62	34	48	43	51	16	27	0.55	0.58	0.45	o	0.84	0.59
Aylesford	BM	1E30/18.2	W.A. Sturge	F	very rolled	151	84	33	50	35	69	17	34	0.39	0.56	0.33	p	0.51	0.50
Aylesford	BM	1E30/18.3	W.A. Sturge	F	very rolled	130	77	48	32	36	73	17	35	0.62	0.59	0.25	p	0.49	0.49
Aylesford	BM	1E30/18.4	W.A. Sturge	FM	very rolled	132	69	36	39	33	66	19	36	0.52	0.52	0.30	p	0.50	0.53
Aylesford	BM	1E30/17.1	W.A. Sturge	F	very rolled	143	79	40	60	35	78	15	35	0.51	0.55	0.42	o	0.45	0.43
Aylesford	BM	1E30/17.2	W.A. Sturge	F	very rolled	125	84	35	28	25	83	17	30	0.42	0.67	0.22	p	0.30	0.57
Aylesford	BM	1E30/17.3	W.A. Sturge	F	rolled	114	62	36	38	32	58	14	32	0.58	0.54	0.33	p	0.55	0.44
Aylesford	BM	1E30/17.4	W.A. Sturge	FM	very rolled	125	80	37	29	26	78	13	35	0.46	0.64	0.23	p	0.33	0.37
Aylesford	BM	1E30/17.5	W.A. Sturge	JK	slightly rolled	90	60	32	38	33	49	16	23	0.53	0.67	0.42	o	0.67	0.70
Aylesford	BM	1E30/17.6	W.A. Sturge	D	rolled	124	61	45	49	35	55	14	40	0.74	0.49	0.40	o	0.64	0.35
Aylesford	BM	1E30/17.7	W.A. Sturge	G	very rolled	116	74	28	49	52	62	16	22	0.38	0.64	0.42	o	0.84	0.73
Aylesford	BM	1E30/16.1	W.A. Sturge	FG	rolled	126	66	47	41	43	56	15	33	0.71	0.52	0.33	p	0.77	0.45
Aylesford	BM	1E30/16.2	W.A. Sturge	J	slightly rolled	100	65	27	27	36	62	9	21	0.42	0.65	0.27	p	0.58	0.43
Aylesford	BM	1E30/16.3	W.A. Sturge	F	rolled	200	105	40	62	50	97	16	36	0.38	0.53	0.31	p	0.52	0.44
Aylesford	BM	1E30/16.4	W.A. Sturge	K	slightly rolled	121	73	35	55	52	57	16	29	0.48	0.60	0.45	o	0.91	0.55
Aylesford	BM	1E30/16.5	W.A. Sturge	FM	slightly rolled	174	90	40	55	49	85	17	33	0.44	0.52	0.32	p	0.58	0.52

Aylesford	BM	1E30/14.1	W.A. Sturge	F	very rolled	139	82	44	44	32	67	19	35	0.54	0.59	0.32	p	0.48	0.54
Aylesford	BM	1E30/14.2	W.A. Sturge	G	very rolled	111	78	34	44	47	72	18	29	0.44	0.70	0.40	o	0.65	0.62
Aylesford	BM	1E30/14.3	W.A. Sturge	FG	very rolled	119	75	41	33	38	63	19	27	0.55	0.63	0.28	p	0.60	0.70
Aylesford	BM	1E30/13.1	IOA	E	very rolled	88	61	25	44	41	45	14	20	0.41	0.69	0.50	o	0.91	0.70
Aylesford	BM	1E30/13.2	IOA	J	rolled	108	75	24	38	36	65	13	19	0.32	0.69	0.35	o	0.55	0.68
Aylesford	BM	1E30/13.3	IOA	DF	very rolled	160	79	38	51	49	67	21	36	0.48	0.49	0.32	p	0.73	0.58
Aylesford	BM	1E30/13.4	IOA	F	very rolled	119	90	39	25	36	88	17	36	0.43	0.76	0.21	p	0.41	0.47
Aylesford	BM	1E30/13.5	IOA	K	very rolled	124	77	32	25	56	77	16	26	0.42	0.62	0.20	p	0.73	0.62
Aylesford	BM	1E30/12.1	IOA	HK	slightly rolled	143	82	33	67	68	74	20	27	0.40	0.57	0.47	o	0.92	0.74
Aylesford	BM	1E30/12.2	IOA	DK	rolled	154	86	33	60	43	80	14	27	0.38	0.56	0.39	o	0.54	0.52
Aylesford	BM	1E30/12.3	IOA	F	slightly rolled	188	87	56	46	46	82	19	53	0.64	0.46	0.24	p	0.56	0.36
Aylesford	BM	1E30/12.4	IOA	F	rolled	173	92	48	40	47	92	16	42	0.52	0.53	0.23	p	0.51	0.38
Aylesford	BM	1E30/11.1	IOA	DF	very rolled	106	77	37	26	38	65	19	27	0.48	0.73	0.25	p	0.58	0.70
Aylesford	BM	1E30/11.2	IOA	DF	very rolled	158	80	29	55	46	63	18	26	0.36	0.51	0.35	p	0.73	0.69
Aylesford	BM	1E30/10.1	IOA	FG	rolled	202	98	36	70	47	89	20	32	0.37	0.49	0.35	p	0.53	0.63
Aylesford	BM	1E30/9.1	IOA	HK	rolled	137	78	34	60	58	65	22	23	0.44	0.57	0.44	o	0.89	0.96
Aylesford	BM	1E30/7.1	Christy	D	very rolled	114	76	44	33	43	63	18	34	0.58	0.67	0.29	p	0.68	0.53
Aylesford	BM	1E30/7.2	Christy	F	very rolled	188	94	40	51	42	89	16	33	0.43	0.50	0.27	p	0.47	0.48
Aylesford	BM	1E30/7.3	Christy	F	rolled	209	104	56	55	57	103	25	55	0.54	0.50	0.26	p	0.55	0.45
Aylesford	BM	1E30/7.4	Christy	G	rolled	159	93	52	58	56	78	22	46	0.56	0.58	0.36	o	0.72	0.48
Aylesford	BM	1E30/4.1	J.P.T. Burchell	K	very rolled	105	72	32	34	55	64	12	27	0.44	0.69	0.32	p	0.86	0.44
Aylesford	BM	1E30/4.2	J.P.T. Burchell	H	rolled	104	68	37	63	64	63	15	33	0.54	0.65	0.61	c	1.02	0.45
Aylesford	BM	1E30/4.3	J.P.T. Burchell	FM	very rolled	113	71	32	35	29	64	15	25	0.45	0.63	0.31	p	0.45	0.60
Aylesford	BM	1E30/4.4	J.P.T. Burchell	F	rolled	133	67	43	37	36	67	15	39	0.64	0.50	0.28	p	0.54	0.38

Aylesford	BM	1E30/4.5	J.P.T. Burchell	DF	very rolled	131	92	41	36	48	90	28	37	0.45	0.70	0.27	p	0.53	0.76
Aylesford	BM	1E30/4.6	J.P.T. Burchell	GJ	slightly rolled	119	78	34	26	47	72	16	30	0.44	0.66	0.22	p	0.65	0.53
Aylesford	BM	1E30/3.1	J.P.T. Burchell	K	very rolled	58	50	21	29	29	40	13	16	0.42	0.86	0.50	o	0.73	0.81
Aylesford	BM	1E30/3.2	J.P.T. Burchell	H	rolled	105	61	39	58	52	54	17	35	0.64	0.58	0.55	c	0.96	0.49
Aylesford	BM	1E30/3.3	J.P.T. Burchell	J	rolled	76	51	20	17	31	45	9	13	0.39	0.67	0.22	p	0.69	0.69
Aylesford	BM	1E30/3.4	J.P.T. Burchell	GK	very rolled	118	65	30	32	40	56	18	25	0.46	0.55	0.27	p	0.71	0.72
Aylesford	BM	1E30/3.5	J.P.T. Burchell	DF	very rolled	129	65	33	39	32	54	17	33	0.51	0.50	0.30	p	0.59	0.52
Aylesford	BM	1E30/3.6	J.P.T. Burchell	E	very rolled	85	55	35	12	26	55	16	29	0.64	0.65	0.14	p	0.47	0.55
Aylesford	BM	1E30/3.7	J.P.T. Burchell	GJ	very rolled	110	73	33	41	41	66	14	29	0.45	0.66	0.37	o	0.62	0.48
Aylesford	BM	1E30/3.8	J.P.T. Burchell	FM	slightly rolled	129	77	30	36	27	72	12	25	0.39	0.60	0.28	p	0.38	0.48
Aylesford	BM	1E30/2.1	J.P.T. Burchell	K	rolled	108	79	29	42	51	69	19	19	0.37	0.73	0.39	o	0.74	1.00
Aylesford	BM	1E30/2.2	J.P.T. Burchell	F	rolled	181	88	52	40	43	88	17	50	0.59	0.49	0.22	p	0.49	0.34
Aylesford	BM	1E30/2.3	J.P.T. Burchell	FG	rolled	102	67	38	38	36	64	16	33	0.57	0.66	0.37	o	0.56	0.48
Aylesford	BM	1E30/2.4	J.P.T. Burchell	D	very rolled	143	86	45	46	52	73	21	30	0.52	0.60	0.32	p	0.71	0.70
Aylesford	BM	1E30/2.5	J.P.T. Burchell	F	rolled	135	73	40	44	34	66	16	37	0.55	0.54	0.33	p	0.52	0.43
Aylesford	BM	1E30/1.1	J.P.T. Burchell	EF	very rolled	92	52	23	31	32	50	16	17	0.44	0.57	0.34	p	0.64	0.94
Aylesford	BM	1E30/1.2	J.P.T. Burchell	DK	slightly rolled	133	69	28	50	50	49	18	20	0.41	0.52	0.38	o	1.02	0.90
Aylesford	BM	1E30/1.3	J.P.T. Burchell	K	very rolled	66	63	22	36	44	48	11	18	0.35	0.95	0.55	o	0.92	0.61
Aylesford	BM	1E30/1.4	J.P.T. Burchell	G	rolled	125	70	40	44	45	60	16	31	0.57	0.56	0.35	o	0.75	0.52
Aylesford	BM	1E30/1.5	J.P.T. Burchell	H	rolled	178	111	55	74	98	93	22	55	0.50	0.62	0.42	o	1.05	0.40
Aylesford	BM	1E30/1.6	J.P.T. Burchell	K	very rolled	94	83	34	60	62	72	22	18	0.41	0.88	0.64	c	0.86	1.22

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	X-sectional uniformity (T1/T2)
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/15.4	67	42	37	26	60	22	34	33	8	25	0.62	0.63	0.33	P	1.03	0.32
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/25.1	75	57	55	31	144	17	37	57	13	31	0.54	0.76	0.23	P	0.65	0.42
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/15.2	93	58	51	25	128	33	29	54	12	24	0.43	0.62	0.35	O	0.54	0.50
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/20.3	99	67	57	35	221	16	35	67	15	29	0.52	0.68	0.16	P	0.52	0.52
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/26.3	100	63	61	30	193	42	53	53	17	28	0.48	0.63	0.42	O	1.00	0.61
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/19.3	105	60	60	42	223	52	40	46	15	39	0.70	0.57	0.50	O	0.87	0.38
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/20.1	111	66	47	32	223	28	31	67	12	34	0.48	0.59	0.25	P	0.46	0.35
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/19.2	112	66	59	30	245	33	38	64	13	29	0.45	0.59	0.29	P	0.59	0.45
Baker's Farm	Baker's Farm Pit	PRM	AD Lacaille	Box 98.5	117	49	38	28		27	19	47	8	24	0.57	0.42	0.23	p	0.40	0.33
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/16.1	120	87	64	36	289	21	27	88	11	31	0.41	0.73	0.18	P	0.31	0.35
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/15.1	124	67	60	32	274	40	47	54	11	31	0.48	0.54	0.32	P	0.87	0.35
Baker's Farm	Baker's Farm Pit	PRM	AD Lacaille	Box 98.1	127	98	95	49		54	66	81	23	46	0.50	0.77	0.43	o	0.81	0.50
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/16.2	128	62	56	31	216	56	24	62	12	26	0.50	0.48	0.44	O	0.39	0.46
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/20.5	137	76	58	45	414	39	38	66	16	43	0.59	0.55	0.28	P	0.58	0.37
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/25.2	140	88	74	53	530	28	56	89	21	39	0.60	0.63	0.20	P	0.63	0.54
Baker's Farm	Baker's Farm Pit	PRM	AD Lacaille	Box 98.6	145	84	71	35		25	45	84	17	29	0.42	0.58	0.17	p	0.54	0.59
Baker's Farm	Baker's Farm Pit	PRM	AD Lacaille	Box 98.2	157	87	73	46		57	44	64	15	43	0.53	0.55	0.36	o	0.69	0.35

Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/25.3	158	91	89	48	771	78	89	79	17	36	0.53	0.58	0.49	O	1.13	0.47
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/17.1	167	88	74	50	554	54	44	70	18	29	0.57	0.53	0.32	P	0.63	0.62
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/1.1	173	95	62	38	572	36	32	92	21	35	0.40	0.55	0.21	P	0.35	0.60
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/18.1	180	93	65	46	632	36	41	93	20	43	0.49	0.52	0.20	P	0.44	0.47
Baker's Farm	Baker's Farm Pit	PRM	AD Lacaille	Box 98.4	185	96	70	50		54	42	88	15	44	0.52	0.52	0.29	p	0.48	0.34
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/18.2	186	86	60	46	607	35	39	84	16	43	0.53	0.46	0.19	P	0.46	0.37
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/17.2	193	102	89	36	674	53	51	89	17	31	0.35	0.53	0.27	P	0.57	0.55
Baker's Farm	Baker's Farm Pit	PRM	AD Lacaille	Box 98.3	209	100	70	43		45	46	99	17	39	0.43	0.48	0.22	p	0.46	0.44
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/4.1	161	102	92	45	637	114	57	95	21	25	0.44	0.63	0.71	C	0.60	1.19
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/20.2	124	78	55	32	271	18	41	74	14	28	0.41	0.63	0.15	P	0.55	0.50
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/15.3	102	61	47	32	130	30	56	53	9	28	0.52	0.60	0.29	P	1.06	0.32
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/19.1	115	64	59	30	240	36	38	59	17	23	0.47	0.56	0.31	P	0.64	0.74
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/26.1	126	78	77	60	511	34	63	75	16	33	0.77	0.62	0.27	P	0.84	0.48
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/20.4	128	77	57	37	311	33	34	73	14	36	0.48	0.60	0.26	p	0.47	0.39
Baker's Farm	Baker's Farm Pit	BM	AD Lacaille	1B1/26.2	140	83	81	43	438	61	62	69	17	42	0.52	0.59	0.44	O	0.90	0.40

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Baker's Farm	1B1/15.4	E	fresh		p	0	15	a	0	6.24				x					
Baker's Farm	1B1/25.1	E	fresh		p	0	40	a	2	5									
Baker's Farm	1B1/15.2	EF	almost fresh		f	0	10	m	1	5.13				x					
Baker's Farm	1B1/20.3	E	almost fresh		f	0	5	m	2	3.32									
Baker's Farm	1B1/26.3	H	almost fresh	18	u	1	40	b	0	4.56									
Baker's Farm	1B1/19.3	E	fresh		f	0	5	a	0	3.88							x		
Baker's Farm	1B1/20.1	FM	fresh		p	0	20	b	2	6.21				x					
Baker's Farm	1B1/19.2	FG	almost fresh		p	0	10	b	2	4.63		x							
Baker's Farm	Box 98.5	F	fresh	47	f	0	0	n	1	2.01		x							
Baker's Farm	1B1/16.1	F	almost fresh		p	0	10	b	0	2.57									
Baker's Farm	1B1/15.1	GK	almost fresh		f	0	0	n	2	8.16								x	
Baker's Farm	Box 98.1	HK	not fresh	37	p	0	15	a	0	4.47		x							
Baker's Farm	1B1/16.2	FM	almost fresh		f	0	15	m	2	3.26									
Baker's Farm	1B1/20.5	FM	almost fresh		u	0	20	b	0	5.46	x			x					
Baker's Farm	1B1/25.2	GH	almost fresh		f	0	0	n	2	5.93									
Baker's Farm	Box 98.6	DF	almost fresh	45	f	0	0	n	2	4.34	x								
Baker's Farm	Box 98.2	F	almost fresh	52	p	0	10	a	0	2.81		x							
Baker's Farm	1B1/25.3	H	almost fresh		f	0	10	m	2	3.52									
Baker's Farm	1B1/17.1	DF	almost fresh		u	0	50	b	0	5.24	x			x					
Baker's Farm	1B1/1.1	M	not fresh		f	0	5	m	2	3.82			x						

Baker's Farm	1B1/18.1	FM	fresh		f	0	0	n	2	4.15			x				x		
Baker's Farm	Box 98.4	FM	almost fresh	58	p	1	10	a	0	2.38				x					
Baker's Farm	1B1/18.2	M	fresh		f	0	0	n	2	2.09			x						
Baker's Farm	1B1/17.2	F	almost fresh		p	0	5	a	2	1.52									
Baker's Farm	Box 98.3	M	almost fresh	73	f	1	10	m	0	3.79			x						
Baker's Farm	1B1/4.1	F	almost fresh		f	0	0	n	2	6.69									x
Baker's Farm	1B1/20.2	F	almost fresh		f	0	0	n	2	5									x
Baker's Farm	1B1/15.3	F	almost fresh		u	0	40	b	0	5.52						x			
Baker's Farm	1B1/19.1	GK	almost fresh		f	0	10	m	2	5.63						x			
Baker's Farm	1B1/26.1	GH	almost fresh		u	0	30	b	0	6.11						x			
Baker's Farm	1B1/20.4	F	almost fresh		u	0	25	b	0	3.49						x			
Baker's Farm	1B1/26.2	GH	almost fresh		p	1	10	a	0	8.24						x		x	

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Biddenham	Biddenham	BM	Wyatt	1A1/11.1	171	91	75	51	690	58	35	87	16	48	0.56	0.53	0.34	P	0.40	0.33
Biddenham	Biddenham	BM	Wyatt	1A1/11.2	146	90	87	39	520	53	56	76	18	37	0.43	0.62	0.36	O	0.74	0.49
Biddenham	Biddenham	BM	Wyatt	1A1/12.1	119	65	64	32	254	56	35	57	11	27	0.49	0.55	0.47	O	0.61	0.41
Biddenham	Biddenham	BM	Wyatt	1A1/12.2	114	65	56	36	195	34	28	57	13	30	0.55	0.57	0.30	P	0.49	0.43
Biddenham	Biddenham	BM	Wyatt	1A1/12.3	172	99	85	40	653	39	50	96	19	32	0.40	0.58	0.23	P	0.52	0.59
Biddenham	Biddenham	BM	Wyatt	1A1/12.4	112	75	64	31	226	34	35	73	12	27	0.41	0.67	0.30	P	0.48	0.44
Biddenham	Biddenham	BM	Wyatt	1A1/13.1	148	94	84	59	732	38	61	91	18	55	0.63	0.64	0.26	P	0.67	0.33
Biddenham	Biddenham	BM	Wyatt	1A1/13.2	89	54	49	29	110	34	24	47	9	26	0.54	0.61	0.38	O	0.51	0.35
Biddenham	Biddenham	BM	Wyatt	1A1/13.3	91	60	44	20	108	26	24	56	9	17	0.33	0.66	0.29	P	0.43	0.53
Biddenham	Biddenham	BM	Wyatt	1A1/13.4	103	58	50	47	194	29	27	57	12	41	0.81	0.56	0.28	P	0.47	0.29
Biddenham	Biddenham	BM	Wyatt	1A1/13.5	93	47	44	34	144	54	31	38	10	31	0.72	0.51	0.58	C	0.82	0.32
Biddenham	Biddenham	BM	Wyatt	1A1/14.1	155	98	83	37	479	56	40	85	17	27	0.38	0.63	0.36	O	0.47	0.63
Biddenham	Biddenham	BM	Wyatt	1A1/14.2	97	61	49	37	169	16	31	60	15	32	0.61	0.63	0.16	P	0.52	0.47
Biddenham	Biddenham	BM	Wyatt	1A1/14.3	125	74	70	46	414	34	42	67	17	40	0.62	0.59	0.27	P	0.63	0.43
Biddenham	Biddenham	BM	Wyatt	1A1/14.4	136	69	66	25	279	45	35	61	12	25	0.36	0.51	0.33	P	0.57	0.48
Biddenham	Biddenham	BM	Wyatt	1A1/14.5	101	52	50	40	165	40	27	46	9	37	0.77	0.51	0.40	O	0.59	0.24
Biddenham	Biddenham	BM	Wyatt	1A1/15.1	93	60	54	33	179	17	34	61	13	31	0.55	0.65	0.18	P	0.56	0.42
Biddenham	Biddenham	BM	Wyatt	1A1/15.2	131	75	55	35	272	24	31	75	12	31	0.47	0.57	0.18	P	0.41	0.39
Biddenham	Biddenham	BM	Wyatt	1A1/17.1	121	81	78	38	401	49	50	74	14	35	0.47	0.67	0.40	O	0.68	0.40
Biddenham	Biddenham	BM	Wyatt	1A1/17.2	118	64	48	31	195	23	27	64	12	30	0.48	0.54	0.19	P	0.42	0.40

Biddenham	Biddenham	BM	Wyatt	1A1/17.3	116	63	58	41	264	14	33	59	13	37	0.65	0.54	0.12	P	0.56	0.35
Biddenham	Biddenham	BM	Wyatt	1A1/17.4	82	53	38	24	85	18	19	52	6	23	0.45	0.65	0.22	P	0.37	0.26
Biddenham	Biddenham	BM	Wyatt	1A1/17.5	106	60	54	33	176	26	34	55	15	24	0.55	0.57	0.25	P	0.62	0.63
Biddenham	Biddenham	BM	Wyatt	1A1/17.6	119	67	56	35	227	25	34	60	11	31	0.52	0.56	0.21	P	0.57	0.35
Biddenham	Biddenham	BM	Wyatt	1A1/18.1	152	81	72	39	505	44	45	72	14	39	0.48	0.53	0.29	P	0.63	0.36
Biddenham	Biddenham	BM	Wyatt	1A1/18.2	96	62	49	29	128	22	27	62	8	28	0.47	0.65	0.23	P	0.44	0.29
Biddenham	Biddenham	BM	Wyatt	1A1/18.3	86	46	36	32	101	31	20	45	8	27	0.70	0.53	0.36	O	0.44	0.30
Biddenham	Biddenham	BM	Wyatt	1A1/18.4	96	66	65	41	277	19	36	66	12	41	0.62	0.69	0.20	P	0.55	0.29
Biddenham	Biddenham	BM	Wyatt	1A1/19.1	115	64	55	49	257	23	35	61	10	44	0.77	0.56	0.20	P	0.57	0.23
Biddenham	Biddenham	BM	Wyatt	1A1/19.2	91	66	55	36	171	19	36	65	12	29	0.55	0.73	0.21	P	0.55	0.41
Biddenham	Biddenham	BM	Wyatt	1A1/19.3	191	111	107	40	881	76	82	78	19	37	0.36	0.58	0.40	O	1.05	0.51
Biddenham	Biddenham	BM	Wyatt	1A1/20.1	100	66	60	39	205	19	31	64	11	38	0.59	0.66	0.19	P	0.48	0.29
Biddenham	Biddenham	BM	Wyatt	1A1/20.2	97	53	42	30	142	29	27	51	13	21	0.57	0.55	0.30	P	0.53	0.62
Biddenham	Biddenham	BM	Wyatt	1A1/20.3	106	57	48	27	174	29	29	51	16	26	0.47	0.54	0.27	P	0.57	0.62
Biddenham	Biddenham	BM	Wyatt	1A1/20.4	102	78	72	44	360	23	39	77	24	39	0.56	0.76	0.23	P	0.51	0.62
Biddenham	Biddenham	BM	Wyatt	1A1/20.5	114	79	69	46	344	34	43	75	22	38	0.58	0.69	0.30	P	0.57	0.58
Biddenham	Biddenham	BM	Wyatt	1A1/21.1	159	91	85	65	875	79	60	76	18	67	0.71	0.57	0.50	O	0.79	0.27
Biddenham	Biddenham	BM	Wyatt	1A1/21.2	90	69	67	36	217	29	41	58	13	29	0.52	0.77	0.32	P	0.71	0.45
Biddenham	Biddenham	BM	Wyatt	1A1/21.3	99	47	43	26	121	28	21	45	12	24	0.55	0.47	0.28	P	0.47	0.50
Biddenham	Biddenham	BM	Wyatt	1A1/21.4	175	89	78	35	629	37	54	88	23	35	0.39	0.51	0.21	P	0.61	0.66
Biddenham	Biddenham	BM	Wyatt	1A1/21.5	99	56	52	31	146	39	33	50	12	28	0.55	0.57	0.39	O	0.66	0.43
Biddenham	Biddenham	BM	Wyatt	1A1/22.1	92	64	59	32	157	31	43	51	13	17	0.50	0.70	0.34	P	0.84	0.76
Biddenham	Biddenham	BM	Wyatt	1A1/22.2	130	71	60	39	344	43	40	57	12	36	0.55	0.55	0.33	P	0.70	0.33

Biddenham	Biddenham	BM	Wyatt	1A1/22.3	116	75	65	25	233	39	46	70	13	22	0.33	0.65	0.34	P	0.66	0.59
Biddenham	Biddenham	BM	Wyatt	1A1/24.2	74	57	54	26	105	33	35	50	16	18	0.46	0.77	0.45	O	0.70	0.89
Biddenham	Biddenham	BM	Wyatt	1A1/24.3	100	60	59	33	175	43	32	47	16	24	0.55	0.60	0.43	O	0.68	0.67
Biddenham	Biddenham	PRM	Knowles	Box 158.1	188	121	101	54		58	61	114	26	53	0.45	0.64	0.31	P	0.54	0.49
Biddenham	Biddenham	PRM	Knowles	Box 158.10	119	93	87	47		52	65	85	20	38	0.51	0.78	0.44	O	0.76	0.53
Biddenham	Biddenham	PRM	Knowles	Box 158.11	137	106	94	58		42	53	93	20	59	0.55	0.77	0.31	P	0.57	0.34
Biddenham	Biddenham	PRM	Knowles	Box 158.2	126	73	68	33		47	38	59	14	30	0.45	0.58	0.37	O	0.64	0.47
Biddenham	Biddenham	PRM	Knowles	Box 158.3	163	119	97	46		48	54	101	20	38	0.39	0.73	0.29	P	0.53	0.53
Biddenham	Biddenham	PRM	Knowles	Box 158.4	91	65	61	25		37	37	50	11	22	0.38	0.71	0.41	O	0.74	0.50
Biddenham	Biddenham	PRM	Knowles	Box 158.5	124	69	67	38		48	45	59	12	35	0.55	0.56	0.39	O	0.76	0.34
Biddenham	Biddenham	PRM	Knowles	Box 158.6	121	94	93	47		75	76	68	26	33	0.50	0.78	0.62	C	1.12	0.79
Biddenham	Biddenham	PRM	Knowles	Box 158.7	105	71	53	33		16	28	67	12	31	0.46	0.68	0.15	P	0.42	0.39
Biddenham	Biddenham	PRM	Knowles	Box 158.8	132	96	84	49		32	59	93	21	45	0.51	0.73	0.24	P	0.63	0.47
Biddenham	Biddenham	PRM	Knowles	Box 158.9	133	84	68	51		31	37	82	18	51	0.61	0.63	0.23	P	0.45	0.35
Biddenham	Biddenham	PRM	Knowles	Box 159.1	146	76	71	36		48	40	61	17	36	0.47	0.52	0.33	P	0.66	0.47
Biddenham	Biddenham	PRM	Knowles	Box 159.10	126	69	65	46		57	44	62	19	38	0.67	0.55	0.45	O	0.71	0.50
Biddenham	Biddenham	PRM	Knowles	Box 159.11	122	82	76	33		35	44	74	13	28	0.40	0.67	0.29	P	0.59	0.46
Biddenham	Biddenham	PRM	Knowles	Box 159.12	154	77	61	45		40	41	72	13	45	0.58	0.50	0.26	P	0.57	0.29
Biddenham	Biddenham	PRM	Knowles	Box 159.2	116	61	61	36		58	36	53	11	32	0.59	0.53	0.50	O	0.68	0.34
Biddenham	Biddenham	PRM	Knowles	Box 159.3	106	80	60	41		30	32	75	18	39	0.51	0.75	0.28	P	0.43	0.46
Biddenham	Biddenham	PRM	Knowles	Box 159.4	97	69	53	29		24	30	65	16	24	0.42	0.71	0.25	P	0.46	0.67
Biddenham	Biddenham	PRM	Knowles	Box 159.5	97	52	47	24		38	29	46	9	17	0.46	0.54	0.39	O	0.63	0.53
Biddenham	Biddenham	PRM	Knowles	Box 159.6	81	53	47	23		24	33	51	15	20	0.43	0.65	0.30	P	0.65	0.75

Biddenham	Biddenham	PRM	Knowles	Box 159.7	119	65	56	34		40	39	57	14	30	0.52	0.55	0.34	P	0.68	0.47
Biddenham	Biddenham	PRM	Knowles	Box 159.8	125	71	67	23		55	50	64	16	17	0.32	0.57	0.44	O	0.78	0.94
Biddenham	Biddenham	PRM	Knowles	Box 159.9	82	60	47	27		16	29	60	16	22	0.45	0.73	0.20	P	0.48	0.73
Biddenham	Biddenham	PRM	Knowles	Box 160.1	185	111	92	32		61	54	75	21	22	0.29	0.60	0.33	P	0.72	0.95
Biddenham	Biddenham	PRM	Knowles	Box 160.10	78	41	39	27		31	25	34	13	28	0.66	0.53	0.40	O	0.74	0.46
Biddenham	Biddenham	PRM	Knowles	Box 160.11	109	70	65	48		34	34	57	15	37	0.69	0.64	0.31	P	0.60	0.41
Biddenham	Biddenham	PRM	Knowles	Box 160.12	115	54	49	37		28	30	47	16	32	0.69	0.47	0.24	P	0.64	0.50
Biddenham	Biddenham	PRM	Knowles	Box 160.13	92	61	53	33		21	27	60	10	29	0.54	0.66	0.23	P	0.45	0.34
Biddenham	Biddenham	PRM	Knowles	Box 160.14	87	59	46	29		19	20	57	10	28	0.49	0.68	0.22	P	0.35	0.36
Biddenham	Biddenham	PRM	Knowles	Box 160.15	143	75	73	40		45	49	56	17	44	0.53	0.52	0.31	P	0.88	0.39
Biddenham	Biddenham	PRM	Knowles	Box 160.2	146	98	98	61		75	84	83	23	52	0.62	0.67	0.51	O	1.01	0.44
Biddenham	Biddenham	PRM	Knowles	Box 160.3	143	75	59	33		40	38	75	14	30	0.44	0.52	0.28	P	0.51	0.47
Biddenham	Biddenham	PRM	Knowles	Box 160.4	102	62	50	32		34	38	55	17	32	0.52	0.61	0.33	P	0.69	0.53
Biddenham	Biddenham	PRM	Knowles	Box 160.5	104	65	59	33		33	36	50	15	28	0.51	0.63	0.32	P	0.72	0.54
Biddenham	Biddenham	PRM	Knowles	Box 160.6	97	53	45	40		28	28	46	11	32	0.75	0.55	0.29	P	0.61	0.34
Biddenham	Biddenham	PRM	Knowles	Box 160.7	116	76	65	42		37	39	69	16	39	0.55	0.66	0.32	P	0.57	0.41
Biddenham	Biddenham	PRM	Knowles	Box 160.8	88	65	50	25		26	30	55	10	22	0.38	0.74	0.30	P	0.55	0.45
Biddenham	Biddenham	PRM	Knowles	Box 160.9	86	74	64	26		18	37	71	17	25	0.35	0.86	0.21	P	0.52	0.68
Biddenham	Biddenham	PRM	Knowles	Box 163.1	98	73	47	26		15	38	73	12	25	0.36	0.74	0.15	P	0.52	0.48
Biddenham	Biddenham	PRM	Knowles	Box 163.2	93	67	53	36		15	31	66	15	35	0.54	0.72	0.16	P	0.47	0.43
Biddenham	Biddenham	PRM	Knowles	Box 163.3	95	64	62	36		41	45	53	15	24	0.56	0.67	0.43	O	0.85	0.63
Biddenham	Biddenham	PRM	Knowles	Box 163.4	93	56	45	35		29	29	48	12	32	0.63	0.60	0.31	P	0.60	0.38
Biddenham	Biddenham	PRM	Knowles	Box 163.5	96	69	56	31		25	27	66	17	28	0.45	0.72	0.26	P	0.41	0.61

Biddenham	Biddenham	PRM	Knowles	Box 163.6	102	53	51	36		32	25	32	16	33	0.68	0.52	0.31	P	0.78	0.48
Biddenham	Biddenham	PRM	Knowles	Box 163.7	173	115	114	44		81	72	88	25	35	0.38	0.66	0.47	O	0.82	0.71
Biddenham	Biddenham	PRM	Knowles	Box 164.1	196	102	64	56		26	45	99	18	53	0.55	0.52	0.13	P	0.45	0.34
Biddenham	Biddenham	PRM	Knowles	Box 164.2	120	113	99	40		85	110	85	27	28	0.35	0.94	0.71	C	1.29	0.96
Biddenham	Biddenham	PRM	Knowles	Box 164.3	104	60	56	32		42	35	54	9	30	0.53	0.58	0.40	O	0.65	0.30
Biddenham	Biddenham	PRM	Knowles	Box 164.4	107	58	45	23		32	31	53	12	25	0.40	0.54	0.30	P	0.58	0.48
Biddenham	Biddenham	PRM	Knowles	Box 164.5	92	55	50	29		26	36	50	13	21	0.53	0.60	0.28	P	0.72	0.62
Biddenham	Biddenham	PRM	Knowles	Box 164.6	130	73	68	32		54	40	48	11	27	0.44	0.56	0.42	O	0.83	0.41
Biddenham	Biddenham	PRM	Knowles	Box 164.7	143	76	71	33		27	39	75	15	34	0.43	0.53	0.19	P	0.52	0.44
Biddenham	Biddenham	PRM	Knowles	Box 164.8	82	54	53	24		39	39	44	10	22	0.44	0.66	0.48	O	0.89	0.45
Biddenham	Biddenham	PRM	Knowles	Box 164.9	83	56	53	35		26	32	50	11	35	0.63	0.67	0.31	P	0.64	0.31
Biddenham	Biddenham	PRM	Knowles	Box 166.1	84	59	56	27		23	36	49	12	25	0.46	0.70	0.27	P	0.73	0.48
Biddenham	Biddenham	PRM	Knowles	Box 168.1	135	88	63	44		24	46	76	19	44	0.50	0.65	0.18	P	0.61	0.43
Biddenham	Biddenham	PRM	Knowles	Box 168.2	101	51	51	24		49	37	33	12	23	0.47	0.50	0.49	O	1.12	0.52
Biddenham	Biddenham	PRM	Knowles	Box 168.3	90	58	49	36		22	25	55	12	31	0.62	0.64	0.24	P	0.45	0.39
Biddenham	Biddenham	PRM	Knowles	Box 168.4	95	61	46	33		24	22	50	12	35	0.54	0.64	0.25	P	0.44	0.34
Biddenham	Biddenham	PRM	Knowles	Box 168.5	94	59	54	32		15	32	55	17	34	0.54	0.63	0.16	P	0.58	0.50
Biddenham	Biddenham	PRM	Knowles	Box 168.6	72	56	56	24		31	26	50	15	15	0.43	0.78	0.43	O	0.52	1.00
Biddenham	Biddenham	PRM	Knowles	Box 168.7	65	52	49	22		14	28	52	11	22	0.42	0.80	0.22	P	0.54	0.50
Biddenham	Biddenham	PRM	Knowles	Box 168.8	99	60	40	16		22	22	54	10	13	0.27	0.61	0.22	P	0.41	0.77
Biddenham	Biddenham	PRM	Knowles	Box 169.1	118	84	77	26		76	77	71	19	28	0.31	0.71	0.64	C	1.08	0.68
Biddenham	Biddenham	PRM	Knowles	Box 169.2	135	78	76	43		45	56	66	15	33	0.55	0.58	0.33	P	0.85	0.45
Biddenham	Biddenham	PRM	Knowles	Box 174.1	143	91	85	33		29	56	87	20	30	0.36	0.64	0.20	P	0.64	0.67

Biddenham	Biddenham	PRM	Knowles	Box 174.2	95	72	54	36		20	28	67	15	32	0.50	0.76	0.21	P	0.42	0.47
Biddenham	Biddenham	PRM	Knowles	Box 175.1	120	71	71	46		57	51	57	19	41	0.65	0.59	0.48	O	0.89	0.46
Biddenham	Biddenham	PRM	Knowles	Box 175.2	143	78	70	40		28	54	75	23	40	0.51	0.55	0.20	P	0.72	0.58
Biddenham	Biddenham	SM		D676	95	84	81	48		55	74	64	24	32	0.57	0.88	0.58	C	1.16	0.75
Biddenham	Biddenham	SM		D683	120	66	56	38		31	32	66	16	40	0.58	0.55	0.26	P	0.48	0.40
Biddenham	Biddenham	SM		D688	99	64	55	42		24	33	51	14	38	0.66	0.65	0.24	P	0.65	0.37
Biddenham	Biddenham	SM		D693	114	60	43	26		25	25	58	10	22	0.43	0.53	0.22	P	0.43	0.45

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Biddenham	1A1/11.1	FM	slightly rolled	48	f	0	0	n	2	2.74									
Biddenham	1A1/11.2	G	very rolled	36	p	0	20	a	0	4.57									
Biddenham	1A1/12.1	FG	slightly rolled	27	p	0	30	a	2	3.04									
Biddenham	1A1/12.2	FG	slightly rolled	35	f	0	0	n	2	6.12							x		
Biddenham	1A1/12.3	F	slightly rolled	50	p	0	25	b	2	2.79									
Biddenham	1A1/12.4	F	very fresh	41	u	0	10	b	0	12.13								x	
Biddenham	1A1/13.1	F	slightly rolled	49	p	0	15	b	0	3.02									
Biddenham	1A1/13.2	EF	very fresh	22	u	1	40	b	0	2.32									
Biddenham	1A1/13.3	EF	rolled	27	f	0	20	m	2	3.35									
Biddenham	1A1/13.4	F	slightly rolled	23	f	0	0	n	2	5.43									
Biddenham	1A1/13.5	F	very fresh	20	u	0	35	b	0	7.6						x			
Biddenham	1A1/14.1	DF	very fresh	29	p	0	15	b	2	8.7	x			x					
Biddenham	1A1/14.2	F	rolled	31	p	0	20	b	2	8.63								x	
Biddenham	1A1/14.3	DF	very rolled	32	f	0	0	n	2	2.51	x								
Biddenham	1A1/14.4	FG	rolled	46	f	0	5	m	2	2.99									
Biddenham	1A1/14.5	EF	slightly rolled	37	p	0	20	b	0	3.63									
Biddenham	1A1/15.1	E	rolled	25	p	0	30	a	0	5.52									
Biddenham	1A1/15.2	F	very rolled	28	f	0	0	n	2	5.87				x					x
Biddenham	1A1/17.1	G	very rolled	32	f	0	45	a	0	3.78									x
Biddenham	1A1/17.2	F	rolled	32	f	0	0	n	2	3.37		x							

Biddenham	1A1/17.3	F	slightly rolled	38	p	0	10	a	2	4.46									
Biddenham	1A1/17.4	EF	very rolled	14	p	0	30	b	0	2.75									
Biddenham	1A1/17.5	F	very fresh	42	f	0	0	n	2	6.11									x
Biddenham	1A1/17.6	F	slightly rolled	43	p	0	10	b	2	5.75								x	
Biddenham	1A1/18.1	FG	very fresh	45	u	0	35	u	0	8.03						x			
Biddenham	1A1/18.2	F	slightly rolled	32	u	0	20	b	2	7.82									
Biddenham	1A1/18.3	EF	slightly rolled	31	p	0	15	b	0	5.58									
Biddenham	1A1/18.4	E	rolled	24	u	0	50	b	2	5.13						x			x
Biddenham	1A1/19.1	F	slightly rolled	35	f	0	0	n	0	3.55		x							
Biddenham	1A1/19.2	E	very fresh	33	p	0	30	b	2	8.82									
Biddenham	1A1/19.3	HK	very fresh	59	u	0	40	b	0	3.93						x			
Biddenham	1A1/20.1	FG	slightly rolled	42	p	0	5	b	2	10.08		x					x		
Biddenham	1A1/20.2	EF	rolled	24	p	0	20	b	2	5.12									
Biddenham	1A1/20.3	F	rolled	26	u	0	35	b	0	5.96						x			
Biddenham	1A1/20.4	E	rolled	23	f	0	60	a	0	3.55									
Biddenham	1A1/20.5	DF	slightly rolled	38	p	0	50	a	0	6.81									
Biddenham	1A1/21.1	DF	slightly rolled	38	p	0	35	a	0	7.14	x					x			
Biddenham	1A1/21.2	K	slightly rolled	33	f	0	0	n	2	3.72									
Biddenham	1A1/21.3	F	rolled	32	f	0	0	n	2	4.95									
Biddenham	1A1/21.4	F	rolled	38	f	1	0	n	2	5.91									
Biddenham	1A1/21.5	GK	slightly rolled	33	f	0	0	n	2	4.11									
Biddenham	1A1/22.1	E	slightly rolled	27	f	0	0	n	2	5.53		x							
Biddenham	1A1/22.2	F	rolled	34	f	0	5	m	2	5.71				x		x			

Biddenham	1A1/22.3	D	very rolled	37	f	0	0	n	2	17.83									
Biddenham	1A1/24.2	JK	rolled	41	f	1	0	n	2	6.65									
Biddenham	1A1/24.3	FG	rolled	19	p	0	55	a	2	3.32									
Biddenham	Box 158.1	D	slightly rolled	33	f	0	0	n	2	2.29									
Biddenham	Box 158.10	HK	very rolled	37	f	0	0	n	2	2.17									
Biddenham	Box 158.11	D	slightly rolled	32	p	0	25	a	2	2.08									
Biddenham	Box 158.2	G	very fresh	55	f	0	0	n	2	2.49									
Biddenham	Box 158.3	D	slightly rolled	34	p	0	30	a	0	3.99			x						
Biddenham	Box 158.4	E	rolled	29	u	0	50	b	0	6.98						x			
Biddenham	Box 158.5	FG	rolled	39	u	0	5	m	0	3.21								x	
Biddenham	Box 158.6	H	slightly rolled	36	f	1	10	m	2	6.26									
Biddenham	Box 158.7	F	very rolled	36	f	0	0	n	2	2.33									x
Biddenham	Box 158.8	FG	rolled	43	p	1	15	a	0	5.77									
Biddenham	Box 158.9	DF	very rolled	41	f	0	5	m	2	2.42									x
Biddenham	Box 159.1	F	very rolled	39	p	0	10	b	2	4.02								x	
Biddenham	Box 159.10	G	very rolled	38	f	0	0	n	2	5.08								x	
Biddenham	Box 159.11	G	slightly rolled	42	f	0	0	n	2	3.16									
Biddenham	Box 159.12	L	slightly rolled	29	f	1	0	n	2	10.38						x			
Biddenham	Box 159.2	FG	rolled	33	f	0	0	n	2	3.84									
Biddenham	Box 159.3	DF	very rolled	28	p	0	40	a	0	3.05									
Biddenham	Box 159.4	F	very rolled	48	p	0	25	b	0	1.63									
Biddenham	Box 159.5	FG	slightly rolled	42	f	0	0	n	2	5.69	x								
Biddenham	Box 159.6	J	very rolled	29	p	0	10	b	2	3.91									

Biddenham	Box 159.7	D	rolled	27	p	0	20	b	1	7.49	x							x
Biddenham	Box 159.8	K	very rolled	50	f	0	25	m	2	4.49								
Biddenham	Box 159.9	EF	very rolled	34	p	0	25	a	2	7.68								
Biddenham	Box 160.1	DF	slightly rolled	35	u	0	70	a	0	3.93								
Biddenham	Box 160.10	E	rolled	29	p	0	5	b	0	3.48			x					
Biddenham	Box 160.11	D	very rolled	30	u	0	25	b	0	7.36								
Biddenham	Box 160.12	DF	rolled	26	u	0	45	b	0	10.13					x			
Biddenham	Box 160.13	F	very fresh	36	f	0	0	n	2	3.7	x							
Biddenham	Box 160.14	E	slightly rolled	28	p	0	10	b	0	4.62						x		
Biddenham	Box 160.15	G	rolled	49	f	0	10	m	2	7.01							x	
Biddenham	Box 160.2	H	very fresh	64	f	0	0	n	2	2.93							x	
Biddenham	Box 160.3	F	very rolled	52	f	0	10	m	2	4.84								x
Biddenham	Box 160.4	D	very rolled	22	p	0	35	a	0	5.9								
Biddenham	Box 160.5	FG	slightly rolled	56	f	0	0	n	2	4.19								
Biddenham	Box 160.6	E	rolled	19	u	0	30	b	0	5.56			x		x			
Biddenham	Box 160.7	FG	very rolled	33	p	0	25	a	0	3.71			x					
Biddenham	Box 160.8	E	very rolled	27	p	0	40	a	0	3.29								
Biddenham	Box 160.9	E	slightly rolled	25	p	0	45	a	0	4.53								
Biddenham	Box 163.1	E	rolled	35	f	0	0	n	2	2.25								
Biddenham	Box 163.2	E	very rolled	26	f	0	5	m	2	7.19								
Biddenham	Box 163.3	K	very rolled	39	f	0	0	n	2	2.11								
Biddenham	Box 163.4	F	very rolled	24	u	0	25	b	0	3.77								
Biddenham	Box 163.5	EF	very rolled	19	p	0	45	a	0	4.62		x						x

Biddenham	Box 163.6	E	very rolled	27	f	0	5	m	2	4.44				x					
Biddenham	Box 163.7	GH	rolled	43	f	0	0	n	2	5.97								x	
Biddenham	Box 164.1	FM	slightly rolled	79	f	0	0	n	0	4.08			x						
Biddenham	Box 164.2	H	rolled	41	f	0	40	m	0	10.97									
Biddenham	Box 164.3	G	rolled	38	f	0	10	m	0	7.34								x	
Biddenham	Box 164.4	F	slightly rolled	45	f	0	0	n	1	4.06									
Biddenham	Box 164.5	E	slightly rolled	34	f	0	10	m	0	7.78						x			
Biddenham	Box 164.6	FG	slightly rolled	36	f	0	0	n	1	4.39							x		
Biddenham	Box 164.7	FG	slightly rolled	69	f	0	0	n	2	3.59		x							
Biddenham	Box 164.8	HK	rolled	44	f	1	0	n	2	5.15									
Biddenham	Box 164.9	E	rolled	33	u	0	20	b	2	5.14									
Biddenham	Box 166.1	J	very rolled	28	p	0	5	b	2	2.76									
Biddenham	Box 168.1	D	slightly rolled	32	p	0	65	a	0	9.47	x								
Biddenham	Box 168.2	E	very rolled	21	p	0	5	b	2	15.78									x
Biddenham	Box 168.3	F	slightly rolled	31	u	0	25	b	0	6.47				x					
Biddenham	Box 168.4	F	rolled	29	f	0	0	n	2	6.4								x	
Biddenham	Box 168.5	E	rolled	28	f	0	0	n	2	6.67									
Biddenham	Box 168.6	E	rolled	27	f	0	0	n	2	6.38									
Biddenham	Box 168.7	E	very rolled	32	p	0	30	a	0	5.6									
Biddenham	Box 168.8	FM	slightly rolled	24	p	0	40	a	2	3.19				x					
Biddenham	Box 169.1	H	slightly rolled	31	f	0	0	n	2	8.51									
Biddenham	Box 169.2	G	rolled	62	f	0	5	m	0	1.71									
Biddenham	Box 174.1	GJ	rolled	63	f	0	0	n	2	2.24									

Biddenham	Box 174.2	E	very rolled	28	p	0	40	b	0	4.43									
Biddenham	Box 175.1	GH	rolled	31	p	0	35	b	0	3.95									
Biddenham	Box 175.2	D	slightly rolled	31	f	1	0	n	2	4.57									
Biddenham	D676	HK	rolled	38	f	1	0	n	2	6.25									
Biddenham	D683	F	rolled	39	f	0	0	n	2	11.39									x
Biddenham	D688	F	rolled	32	f	0	10	m	0	4.74									
Biddenham	D693	FM	slightly rolled	45	p	0	10	b	0				x						

Site	Museum	Collection	Location reference.	Type	Condition	L (mm)	B (mm)	T (mm)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Bromham	BM	Turner	1A2/9.1	FG	rolled	111	69	32	39	39	58	13	24	0.46	0.62	0.35	o	0.67	0.54
Bromham	BM	Turner	1A2/9.2	FM	very rolled	116	77	30	33	40	71	19	29	0.39	0.66	0.28	p	0.56	0.66
Bromham	BM	Turner	1A2/9.3	EF	rolled	95	52	25	26	21	47	9	18	0.48	0.55	0.27	p	0.45	0.50
Bromham	BM	Turner	1A2/9.4	F	rolled	167	75	44	50	46	68	21	30	0.59	0.45	0.30	p	0.68	0.70
Bromham	BM	Turner	1A2/9.5	F	slightly rolled	158	78	46	34	32	76	14	41	0.59	0.49	0.22	p	0.42	0.34
Bromham	BM	Turner	1A2/10.1	F	very rolled	125	82	31	32	36	74	11	26	0.38	0.66	0.26	p	0.49	0.42
Bromham	BM	Turner	1A2/10.2	F	rolled	165	80	33	49	43	71	18	34	0.41	0.48	0.30	p	0.61	0.53
Bromham	BM	Turner	1A2/10.3	E	rolled	93	57	27	31	30	51	13	24	0.47	0.61	0.33	p	0.59	0.54
Bromham	BM	Turner	1A2/10.4	E	very rolled	108	58	30	44	33	55	21	27	0.52	0.54	0.41	o	0.60	0.78
Bromham	BM	Turner	1A2/10.5	E	rolled	79	47	29	25	16	43	11	25	0.62	0.59	0.32	p	0.37	0.44
Bromham	BM	Turner	1A2/10.6	G	slightly rolled	143	83	44	48	51	76	17	39	0.53	0.58	0.34	p	0.67	0.44
Bromham	BM	Turner	1A2/10.7	FG	rolled	118	83	41	40	39	67	16	35	0.49	0.70	0.34	p	0.58	0.46
Bromham	BM	Turner	1A2/11.1	F	very rolled	181	90	43	60	42	86	16	36	0.48	0.50	0.33	p	0.49	0.44
Bromham	BM	Turner	1A2/11.2	E	very rolled	101	55	33	23	25	40	11	26	0.60	0.54	0.23	p	0.63	0.42
Bromham	BM	Turner	1A2/11.3	K	rolled	99	68	23	39	57	63	20	18	0.34	0.69	0.39	o	0.90	1.11
Bromham	BM	Turner	1A2/11.4	F	rolled	125	68	33	31	33	63	13	28	0.49	0.54	0.25	p	0.52	0.46
Bromham	BM	Turner	1A2/11.5	E	very rolled	85	53	25	32	21	46	10	23	0.47	0.62	0.38	o	0.46	0.43
Bromham	BM	Turner	1A2/12.1	H	very rolled	106	88	41	60	74	71	17	37	0.47	0.83	0.57	c	1.04	0.46
Bromham	BM	Turner	1A2/14.1	G	rolled	114	75	42	39	48	62	20	37	0.56	0.66	0.34	p	0.77	0.54
Bromham	BM	Turner	1A2/14.2	FG	slightly rolled	133	72	35	46	37	69	17	28	0.49	0.54	0.35	p	0.54	0.61

Bromham	BM	Turner	1A2/14.3	GK	rolled	174	83	40	55	56	76	24	37	0.48	0.48	0.32	p	0.74	0.65
Bromham	BM	Turner	1A2/14.4	F	rolled	129	73	40	19	28	72	14	36	0.55	0.57	0.15	p	0.39	0.39
Bromham	BM	Turner	1A2/14.5	L	rolled	132	73	36	54	46	57	15	23	0.49	0.55	0.41	o	0.81	0.65
Bromham	BM	Warren	1A2/15.1	H	rolled	113	92	47	64	81	75	25	42	0.51	0.81	0.57	c	1.08	0.60
Bromham	BM	Wyatt	1A2/16.1	F	slightly rolled	136	78	39	30	41	77	20	39	0.50	0.57	0.22	p	0.53	0.51

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant1	81	46		19		28	31	39	14	13	0.41	0.57	0.35	p	0.79	1.08
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant2	90	64		18		33	27	58	18	18	0.28	0.71	0.37	o	0.47	1.00
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant3	122	65		35		28	31	57	13	28	0.54	0.53	0.23	p	0.54	0.46
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant4	188	103		48		48	43	99	20	41	0.47	0.55	0.26	p	0.43	0.49
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant5	139	84		41		26	28	83	13	39	0.49	0.60	0.19	p	0.34	0.33
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant6	164	60		37		25	31	60	13	33	0.62	0.37	0.15	p	0.52	0.39
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant7	180	96		48		48	29	91	14	45	0.50	0.53	0.27	p	0.32	0.31
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant8	181	87		49		20	36	85	15	42	0.56	0.48	0.11	p	0.42	0.36
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant9	223	95		62		74	41	91	17	61	0.65	0.43	0.33	p	0.45	0.28
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant10	212	101		52		45	43	101	14	46	0.51	0.48	0.21	p	0.43	0.30
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant11	184	100		53		42	61	95	22	49	0.53	0.54	0.23	p	0.64	0.45
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant12	123	91		31		73	70	77	17	28	0.34	0.74	0.59	c	0.91	0.61
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant13	147	99		41		81	88	83	23	32	0.41	0.67	0.55	c	1.06	0.72
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant14	148	83		30		73	64	70	21	22	0.36	0.56	0.49	o	0.91	0.95
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant15	138	98		45		87	80	78	16	33	0.46	0.71	0.63	c	1.03	0.48
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant16	116	79		48		53	60	78	25	27	0.61	0.68	0.46	o	0.77	0.93
Canterbury West	Canterbury West	HB	T. Armstrong-Bowes	cant17	135	70		40		29	36	68	17	37	0.57	0.52	0.21	p	0.53	0.46

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Canterbury West	cant1	JK	slightly rolled	12	f	0	0	n	1	3.62									
Canterbury West	cant2	J	slightly rolled	15	f	0	0	n	1	5.96									
Canterbury West	cant3	F	rolled	32	p	0	5	b	2	2.02									
Canterbury West	cant4	F	rolled	39	p	0	5	b	2	2.44									
Canterbury West	cant5	M	rolled	37	f	0	5	m	2	2.79			x						
Canterbury West	cant6	F	very rolled	34	f	0	5	m	2	5.14	x	x		x					
Canterbury West	cant7	FM	slightly rolled	39	f	0	10	a	0	4.38				x					
Canterbury West	cant8	FM	rolled	33	p	0	10	a	0	2.64		x	x						
Canterbury West	cant9	F	rolled	44	p	0	5	m	2	2		x							
Canterbury West	cant10	F	slightly rolled	47	f	0	5	m	2	1.85									
Canterbury West	cant11	GK	slightly rolled	44	f	1	0	n	2	5.07								x	
Canterbury West	cant12	HK	rolled	45	f	0	0	n	2	2.63									
Canterbury West	cant13	H	slightly rolled	39	f	1	0	n	2	3.01									
Canterbury West	cant14	K	rolled	38	p	0	5	b	0	3.87									
Canterbury West	cant15	H	very fresh	36	f	1	10	m	2	2.78									
Canterbury West	cant16	L	rolled	26	f	0	0	n	2	4.58						x			
Canterbury West	cant17	F	slightly rolled	29	p	0	5	b	2	1.22									

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Cookham		ROM	Treacher	AD1047	171	90	79	53	693	57	51	78	17	47	0.59	0.53	0.33	p	0.65	0.36
Cookham		ROM	Treacher	AD163	155	106	100	54	839.1	92	69	86	22	39	0.51	0.68	0.59	c	0.80	0.56
Cookham		ROM	Treacher	AD164	151	91	71	49	635.1	41	53	85	26	39	0.54	0.60	0.27	p	0.62	0.67
Cookham		ROM	Treacher	AD236	181	88	55	50	602.6	40	31	80	17	50	0.57	0.49	0.22	p	0.39	0.34
Cookham		ROM	Treacher	AD240	118	67	51	31	216.6	25	32	66	11	28	0.46	0.57	0.21	p	0.48	0.39
Cookham		ROM	Treacher	AD243	128	84	64	30	344.2	39	42	79	18	28	0.36	0.66	0.30	p	0.53	0.64
Cookham		ROM	Treacher	AD252	125	65	52	27	213.8	34	32	62	18	26	0.42	0.52	0.27	p	0.52	0.69
Cookham		ROM	Treacher	AD256	104	62	50	41	233.4	33	33	60	14	36	0.66	0.60	0.32	p	0.55	0.39
Cookham		ROM	Treacher	AD257	98	62	55	35	191	19	33	60	13	32	0.56	0.63	0.19	p	0.55	0.41
Cookham		ROM	Treacher	AD299	74	53	52	19	78.4	17	34	51	12	18	0.36	0.72	0.23	p	0.67	0.67
Cookham		ROM	Treacher	AD324	97	55	50	44	157.7	36	25	39	11	36	0.80	0.57	0.37	o	0.64	0.31
Cookham		ROM	Treacher	AD332	88	48	38	31	105.3	20	25	48	9	29	0.65	0.55	0.23	p	0.52	0.31
Cookham		ROM	Treacher	AD421	187	109	87	48	899.4	40	55	109	19	48	0.44	0.58	0.21	p	0.50	0.40
Cookham		ROM	Treacher	AD456	103	64	50	35	207.7	22	29	59	13	34	0.55	0.62	0.21	p	0.49	0.38
Cookham		ROM	Treacher	AD476	116	86	70	53	457.7	33	57	84	18	45	0.62	0.74	0.28	p	0.68	0.40
Cookham		ROM	Treacher	AD480	117	72	65	48	355.9	40	36	62	17	37	0.67	0.62	0.34	p	0.58	0.46
Cookham		ROM	Treacher	AD493	105	47	44	32	163.7	32	26	44	12	28	0.68	0.45	0.30	p	0.59	0.43
Cookham	Cookham	ROM	Treacher	AD499	106	49	46	37	176.4	51	34	36	13	33	0.76	0.46	0.48	o	0.94	0.39
Cookham		ROM	Treacher	AD503	106	69	67	38	249.7	44	45	58	15	34	0.55	0.65	0.42	o	0.78	0.44
Cookham		ROM	Treacher	AD522	105	54	52	33	214.4	74	49	51	19	21	0.61	0.51	0.70	c	0.96	0.90
Cookham		ROM	Treacher	AD554	170	80	57	54	694.3	31	37	79	24	50	0.68	0.47	0.18	p	0.47	0.48
Cookham		ROM	Treacher	AD568	114	60	42	49	258.7	22	30	59	15	46	0.82	0.53	0.19	p	0.51	0.33
Cookham		ROM	Treacher	AD571	105	55	47	44	197.7	25	33	51	15	39	0.80	0.52	0.24	p	0.65	0.38
Cookham		ROM	Treacher	AD654	107	66	57	41	281.4	27	36	62	18	29	0.62	0.62	0.25	p	0.58	0.62
Cookham		ROM	Treacher	AD840	126	75	58	28	263.6	30	37	69	15	20	0.37	0.60	0.24	p	0.54	0.75
Cookham		ROM	Treacher	AD895	88	52	43	26	78	17	25	51	10	18	0.50	0.59	0.19	p	0.49	0.56
Cookham	Cookham Dean NFP	AA	Fox	Z28906.1	81	43	38	33	84.6	22	20	42	7	23	0.77	0.53	0.27	p	0.48	0.30

Cookham	Cookham Dean NFP	AA	Fox	Z28906.10	98	65	59	43	211.5	40	33	61	13	38	0.66	0.66	0.41	o	0.54	0.34
Cookham	Cookham Dean NFP	AA	Fox	Z28906.11	101	63	53	40	184.9	29	32	54	13	41	0.63	0.62	0.29	p	0.59	0.32
Cookham	Cookham Dean NFP	AA	Fox	Z28906.12	80	55	44	38	131.6	24	27	41	19	29	0.69	0.69	0.30	p	0.66	0.66
Cookham	Cookham Dean NFP	AA	Fox	Z28906.13	88	55	48	31	124.4	23	31	52	12	22	0.56	0.63	0.26	p	0.60	0.55
Cookham	Cookham Dean NFP	AA	Fox	Z28906.14	93	57	52	34	152	26	29	55	13	38	0.60	0.61	0.28	p	0.53	0.34
Cookham	Cookham Dean NFP	AA	Fox	Z28906.15	80	62	58	30	131.4	20	33	58	10	18	0.48	0.78	0.25	p	0.57	0.56
Cookham	Cookham Dean NFP	AA	Fox	Z28906.16	65	42	41	27	59	25	25	38	7	25	0.64	0.65	0.38	o	0.66	0.28
Cookham	Cookham Dean NFP	AA	Fox	Z28906.2	86	59	57	30	161.1	55	43	39	16	21	0.51	0.69	0.64	c	1.10	0.76
Cookham	Cookham Dean NFP	AA	Fox	Z28906.3	97	52	50	33	134.1	43	32	44	9	27	0.63	0.54	0.44	o	0.73	0.33
Cookham	Cookham Dean NFP	AA	Fox	Z28906.4	89	50	47	37	139.1	27	34	46	13	28	0.74	0.56	0.30	p	0.74	0.46
Cookham	Cookham Dean NFP	AA	Fox	Z28906.5	90	46	42	36	106	26	23	37	10	24	0.78	0.51	0.29	p	0.62	0.42
Cookham	Cookham Dean NFP	AA	Fox	Z28906.6	88	53	48	32	118.6	32	33	46	11	28	0.60	0.60	0.36	o	0.72	0.39
Cookham	Cookham Dean NFP	AA	Fox	Z28906.7	76	58	48	30	128.2	21	34	53	14	24	0.52	0.76	0.28	p	0.64	0.58
Cookham	Cookham Dean NFP	AA	Fox	Z28906.8	85	57	57	31	131	29	32	51	14	18	0.54	0.67	0.34	p	0.63	0.78
Cookham	Cookham Dean NFP	AA	Fox	Z28906.9	91	56	52	33	132.4	38	33	35	13	29	0.59	0.62	0.42	o	0.94	0.45
Cookham	Cookham Dean NFP	AA	Fox	Z28908.1	199	111	97	48	959.1	90	84	52	26	51	0.43	0.56	0.45	o	1.62	0.51
Cookham	Cookham Dean NFP	AA	Fox	Z28908.3	144	83	73	52	543.7	41	53	65	16	47	0.63	0.58	0.28	p	0.82	0.34
Cookham	Cookham Dean NFP	AA	Fox	Z28908.4	158	85	80	45	516.6	67	41	64	17	37	0.53	0.54	0.42	o	0.64	0.46
Cookham	Cookham Dean NFP	AA	Fox	Z28908.5	146	80	71	41	456.9	56	45	74	15	37	0.51	0.55	0.38	o	0.61	0.41
Cookham	Cookham Dean NFP	AA	Fox	Z28908.6	138	87	83	50	499	59	48	57	19	30	0.57	0.63	0.43	o	0.84	0.63
Cookham	Cookham Dean NFP	AA	Fox	Z28908.7	132	73	57	55	366.3	32	34	68	21	40	0.75	0.55	0.24	p	0.50	0.53
Cookham	Cookham Dean NFP	AA	Fox	Z28920.1	104	63	53	28	159	27	35	56	9	21	0.44	0.61	0.26	p	0.63	0.43
Cookham	Cookham Dean NFP	AA	Fox	Z28920.2	75	48	45	30	114.4	20	33	47	14	29	0.63	0.64	0.27	p	0.70	0.48

Cookham	Cookham Dean NFP	AA	Fox	Z28920.3	79	52	43	33	114	21	29	44	13	19	0.63	0.66	0.27	p	0.66	0.68
Cookham	Cookham Dean NFP	AA	Fox	Z28921.1	162	92	88	53	673.1	75	48	60	18	55	0.58	0.57	0.46	o	0.80	0.33
Cookham	Cookham Dean NFP	AA	Fox	Z28921.2	130	80	77	53	481.7	26	44	78	19	51	0.66	0.62	0.20	p	0.56	0.37
Cookham	Cookham Dean NFP	AA	Fox	Z28921.3	145	79	75	40	422.5	45	38	73	13	38	0.51	0.54	0.31	p	0.52	0.34
Cookham	Cookham Dean NFP	AA	Fox	Z28922.1	105	52	45	36	174.8	26	28	50	13	27	0.69	0.50	0.25	p	0.56	0.48
Cookham	Cookham Dean NFP	AA	Fox	Z28922.2	102	64	53	34	191.8	35	33	49	13	34	0.53	0.63	0.34	p	0.67	0.38
Cookham	Cookham Dean NFP	AA	Fox	Z28922.3	112	63	52	30	175	36	32	48	11	32	0.48	0.56	0.32	p	0.67	0.34
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.1	105	65	40	32	157.1	17	26	65	13	32	0.49	0.62	0.16	p	0.40	0.41
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.10	108	80	78	35	279.3	39	51	55	17	29	0.44	0.74	0.36	o	0.93	0.59
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.11	102	74	69	31	244.2	35	41	61	11	27	0.42	0.73	0.34	p	0.67	0.41
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.12	107	64	56	33	204.8	18	29	63	12	32	0.52	0.60	0.17	p	0.46	0.38
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.13	111	71	59	26	196.2	33	36	66	12	24	0.37	0.64	0.30	p	0.55	0.50
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.2	100	56	50	40	204.5	33	39	54	15	30	0.71	0.56	0.33	p	0.72	0.50
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.3	105	59	51	33	177.5	33	30	57	10	32	0.56	0.56	0.31	p	0.53	0.31
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.4	101	69	58	36	194.4	24	27	61	14	32	0.52	0.68	0.24	p	0.44	0.44
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.5	105	65	54	33	196.8	25	36	65	10	33	0.51	0.62	0.24	p	0.55	0.30
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.6	105	70	61	41	250.3	15	40	68	14	37	0.59	0.67	0.14	p	0.59	0.38
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.7	105	66	56	37	177.3	19	26	66	10	32	0.56	0.63	0.18	p	0.39	0.31
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.8	93	60	49	27	158.7	15	38	61	16	17	0.45	0.65	0.16	p	0.62	0.94
Cookham	Cookham Dean NFP	AA	Fox	Z28925.1.9	97	57	44	32	163.5	15	27	57	8	30	0.56	0.59	0.15	p	0.47	0.27
Cookham	Cookham Dean NFP	AA	Fox	Z28925.3	111	57	47	34	199.7	27	33	50	18	34	0.60	0.51	0.24	p	0.66	0.53
Cookham	Cookham Dean NFP	AA	Fox	Z28926.1.1	144	64	56	40	364	40	67	33	33	17	0.63	0.44	0.28	p	2.03	1.94
Cookham	Cookham Dean NFP	AA	Fox	Z28926.1.2	149	85	65	36	380.2	45	35	82	23	35	0.42	0.57	0.30	p	0.43	0.66

Cookham	Cookham Dean NFP	AA	Fox	Z28926.1.3	138	92	92	48	636.4	64	58	81	24	42	0.52	0.67	0.46	o	0.72	0.57
Cookham	Cookham Dean NFP	AA	Fox	Z28926.1.4	131	77	72	49	393.1	29	53	75	15	43	0.64	0.59	0.22	p	0.71	0.35
Cookham	Cookham Dean NFP	AA	Fox	Z28926.1.5	146	72	69	41	419.2	53	38	60	15	32	0.57	0.49	0.36	o	0.63	0.47
Cookham	Cookham Dean NFP	AA	Fox	Z28926.1.6	127	85	82	63	575.5	42	74	43	55	16	0.74	0.67	0.33	p	1.72	3.44
Cookham	Cookham Dean NFP	AA	Fox	Z28926.1.7	127	68	57	39	284.3	37	32	58	13	40	0.57	0.54	0.29	p	0.55	0.33
Cookham	Cookham Dean NFP	AA	Fox	Z28926.1.8	130	55	40	46	256.7	21	26	51	15	40	0.84	0.42	0.16	p	0.51	0.38
Cookham	Cookham Dean NFP	AA	Fox	Z28926.2.6	121	85	61	44	350.4	18	85	32	40	18	0.52	0.70	0.15	p	2.66	2.22
Cookham	Cookham Dean NFP	AA	Fox	Z28926.2.7	156	89	76	39	446.3	40	83	40	38	22	0.44	0.57	0.26	p	2.08	1.73
Cookham	Cookham Dean NFP	AA	Fox	Z28927	204	94	72	63	1029.7	49	49	90	28	60	0.67	0.46	0.24	p	0.54	0.47
Cookham	Cookham Dean NFP	AA	Fox	Z28928.2	121	67	60	32	230	42	49	52	19	28	0.48	0.55	0.35	p	0.94	0.68
Cookham	Cookham Dean NFP	AA	Fox	Z28928.3	94	61	55	35	166.4	15	45	57	11	31	0.57	0.65	0.16	p	0.79	0.35
Cookham	Cookham Dean NFP	AA	Fox	Z28928.4	91	61	57	35	201.5	51	55	47	21	35	0.57	0.67	0.56	c	1.17	0.60
Cookham		AA	Fox	Z28929.1	95	67	63	25	141.4	34	37	59	15	20	0.37	0.71	0.36	o	0.63	0.75
Cookham		AA	Fox	Z28929.2	89	50	47	35	148.6	29	31	42	11	30	0.70	0.56	0.33	p	0.74	0.37
Cookham	Cookham Dean NFP	AA	Fox	Z28932	165	92	73	55	665.4	42	38	85	19	53	0.60	0.56	0.25	p	0.45	0.36
Cookham	Cookham Dean NFP	AA	Fox	Z28933	230	95	85	80	1542.4	95	79	92	30	37	0.84	0.41	0.41	o	0.86	0.81
Cookham	Cookham Dean NFP	AA	Fox	Z28934	125	85	77	50	410.3	47	46	71	19	31	0.59	0.68	0.38	o	0.65	0.61
Cookham		AA	Fox	Z28935	114	61	57	32	195.7	27	29	57	12	24	0.52	0.54	0.24	p	0.51	0.50
Cookham	Cookham Dean NFP	AA	Fox	Z28962.1	113	73	54	33	247.4	35	38	69	17	31	0.45	0.65	0.31	p	0.55	0.55
Cookham	Cookham Dean NFP	AA	Fox	Z28962.2	126	74	69	45	348	47	40	66	18	33	0.61	0.59	0.37	o	0.61	0.55
Cookham	Cookham Dean NFP	AA	Fox	Z28962.3	114	76	65	41	360.9	21	44	75	17	33	0.54	0.67	0.18	p	0.59	0.52
Cookham	Cookham Dean NFP	AA	Fox	Z28963.2	147	82	75	58	633.5	46	50	73	18	40	0.71	0.56	0.31	p	0.68	0.45
Cookham	Cookham Dean NFP	AA	Fox	Z28966.1	96	78	77	40	289.7	61	58	77	18	23	0.51	0.81	0.64	c	0.75	0.78

Cookham	Cookham Dean NFP	AA	Fox	Z28966.2	99	73	73	29	244.4	47	65	59	16	26	0.40	0.74	0.47	o	1.10	0.62
Cookham	Cookham Dean NFP	AA	Fox	Z28967.1	91	68	45	36	188.3	9	26	62	12	36	0.53	0.75	0.10	p	0.42	0.33
Cookham	Cookham Dean NFP	AA	Fox	Z28967.2	82	58	45	40	145.4	25	28	49	18	36	0.69	0.71	0.30	p	0.57	0.50
Cookham	Cookham Dean NFP	AA	Fox	Z28969.1	107	56	50	24	139.3	38	25	46	11	25	0.43	0.52	0.36	o	0.54	0.44
Cookham	Cookham Dean NFP	AA	Fox	Z28969.10	104	59	50	29	136.4	37	32	38	13	29	0.49	0.57	0.36	o	0.84	0.45
Cookham	Cookham Dean NFP	AA	Fox	Z28969.11	105	65	44	43	182	26	28	52	15	32	0.66	0.62	0.25	p	0.54	0.47
Cookham	Cookham Dean NFP	AA	Fox	Z28969.12	103	66	55	37	215.3	30	39	59	19	24	0.56	0.64	0.29	p	0.66	0.79
Cookham	Cookham Dean NFP	AA	Fox	Z28969.13	109	60	58	35	188.6	27	37	57	13	31	0.58	0.55	0.25	p	0.65	0.42
Cookham	Cookham Dean NFP	AA	Fox	Z28969.14	100	64	54	24	159.5	28	30	60	14	25	0.38	0.64	0.28	p	0.50	0.56
Cookham	Cookham Dean NFP	AA	Fox	Z28969.15	121	70	56	45	266.6	43	33	53	11	46	0.64	0.58	0.36	o	0.62	0.24
Cookham	Cookham Dean NFP	AA	Fox	Z28969.16	103	61	61	33	183.8	35	43	21	14	55	0.54	0.59	0.34	p	2.05	0.25
Cookham	Cookham Dean NFP	AA	Fox	Z28969.17	121	68	43	26	196.7	25	68	23	20	12	0.38	0.56	0.21	p	2.96	1.67
Cookham	Cookham Dean NFP	AA	Fox	Z28969.2	102	59	45	41	174	21	25	58	13	34	0.69	0.58	0.21	p	0.43	0.38
Cookham	Cookham Dean NFP	AA	Fox	Z28969.3	110	66	59	47	287.9	37	41	63	18	40	0.71	0.60	0.34	p	0.65	0.45
Cookham	Cookham Dean NFP	AA	Fox	Z28969.4	102	60	45	33	172.1	30	23	51	14	28	0.55	0.59	0.29	p	0.45	0.50
Cookham	Cookham Dean NFP	AA	Fox	Z28969.5	100	70	68	36	221	30	37	57	15	30	0.51	0.70	0.30	p	0.65	0.50
Cookham	Cookham Dean NFP	AA	Fox	Z28969.6	134	67	50	36	233.2	34	70	33	33	10	0.54	0.50	0.25	p	2.12	3.30
Cookham	Cookham Dean NFP	AA	Fox	Z28969.7	113	72	50	29	189.4	26	25	68	14	20	0.40	0.64	0.23	p	0.37	0.70
Cookham	Cookham Dean NFP	AA	Fox	Z28969.8	130	64	42	26	186.6	24	63	26	27	18	0.41	0.49	0.18	p	2.42	1.50
Cookham	Cookham Dean NFP	AA	Fox	Z28969.9	109	63	49	42	230.2	23	62	34	42	13	0.67	0.58	0.21	p	1.82	3.23
Cookham	Cookham Dean NFP	AA	Fox	Z28985	158	89	83	61	772.2	71	61	83	27	56	0.69	0.56	0.45	o	0.73	0.48
Cookham	Cookham Dean NFP	AA	Fox	Z28987	117	60	57	39	305.6	25	33	55	16	35	0.65	0.51	0.21	p	0.60	0.46
Cookham	Cookham Dean NFP	AA	Fox	Z28988	106	70	61	36	219.5	35	43	59	12	22	0.51	0.66	0.33	p	0.73	0.55

Cookham	Cookham Dean NFP	AA	Fox	Z28989	99	73	71	36	269.9	48	49	70	19	35	0.49	0.74	0.48	o	0.70	0.54
Cookham	Cookham Dean NFP	AA	Fox	Z35556	91	58	49	42	193.9	27	36	57	16	42	0.72	0.64	0.30	p	0.63	0.38
Cookham	Cookham Dean NFP	AA	Fox	Z68964	120	64	37	45	177.3	24	20	64	11	28	0.70	0.53	0.20	p	0.31	0.39
Cookham	Cookham Dean NFP	AA	Fox	Z68965	107	61	55	46	229	22	38	60	17	34	0.75	0.57	0.21	p	0.63	0.50

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Cookham	AD1047	FG	fresh	48	f	1	20	a	0	4.14				x					
Cookham	AD163	DK	not fresh	31	f	1	5	m	0	4.47		x							
Cookham	AD164	FG	rolled	42	u	0	25	b	0	9.27									
Cookham	AD236	FM	almost fresh	39	f	0	10	m	0	3.65			x						
Cookham	AD240	F	almost fresh	45	p	0	5	b	0	3.85									
Cookham	AD243	F	rolled	43	f	0	5	m	2	3.56									
Cookham	AD252	FG	not fresh	31	f	0	5	m	2	2.44		x							
Cookham	AD256	DF	rolled	38	p	0	10	b	0										
Cookham	AD257	E	not fresh	38	f	0	5	m	2										
Cookham	AD299	E	not fresh	15	f	0	0	n	1										
Cookham	AD324	EF	not fresh	23	p	0	20	b	2										
Cookham	AD332	EF	rolled	36	f	0	0	n	2										
Cookham	AD421	F	fresh	58	f	0	0	n	2	2.79									
Cookham	AD456	DF	not fresh	22	p	0	25	b	2	3.31									
Cookham	AD476	D	rolled	33	p	0	10	b	2										
Cookham	AD480	DF	rolled	24	p	0	40	b	0	5.35									
Cookham	AD493	DF	rolled	29	f	0	0	n	2	4.27									
Cookham	AD499	DF	not fresh	25	f	0	15	m	0	6.6						x			
Cookham	AD503	G	rolled	28	p	0	35	a	0										
Cookham	AD522	H	rolled	32	f	0	10	a	0										
Cookham	AD554	M	not fresh	38	p	0	20	a	0										
Cookham	AD568	DF	rolled	23	p	0	15	b	0										
Cookham	AD571	DF	rolled	19	p	0	20	a	0	2.29									

Cookham	AD654	GJ	rolled	36	f	0	5	m	2									
Cookham	AD840	F	rolled	42	f	0	5	m	2	3.93								
Cookham	AD895	E	fresh	23	f	0	0	n	1	4.5								
Cookham	Z28906.1	E	fresh	21	p	0	35	b	0	9.56								
Cookham	Z28906.10	E	fresh	40	f	0	10	m	2	7.17	x							
Cookham	Z28906.11	GJ	fresh	34	u	0	15	b	0	5.62								
Cookham	Z28906.12	E	not fresh	25	p	0	10	a	0	3.82								
Cookham	Z28906.13	E	rolled	25	f	0	35	m	0	6.67		x						
Cookham	Z28906.14	E	fresh	20	p	0	15	b	1	9.04								
Cookham	Z28906.15	E	fresh	27	f	0	10	m	1	5.52								
Cookham	Z28906.16	J	fresh	25	p	0	25	b	0	4.91								
Cookham	Z28906.2	H	not fresh	26	f	1	0	n	2	3.8						x		
Cookham	Z28906.3	G	fresh	37	f	0	0	n	2	7.36								x
Cookham	Z28906.4	GK	not fresh	31	p	0	15	a	2	4.33								
Cookham	Z28906.5	EF	almost fresh	31	p	0	15	a	0	5.52								
Cookham	Z28906.6	E	fresh	32	p	0	10	b	0	7.84								
Cookham	Z28906.7	EF	almost fresh	34	f	0	0	n	2	4.82								
Cookham	Z28906.8	J	fresh	32	f	0	20	m	1	5.81		x						
Cookham	Z28906.9	E	fresh	22	p	1	25	b	0	5.69								
Cookham	Z28908.1	H	fresh	38	p	0	25	a	0	8.34								
Cookham	Z28908.3	G	fresh	38	p	1	10	b	2	7.36								x
Cookham	Z28908.4	FG	fresh	53	f	0	10	m	0	3.3			x					
Cookham	Z28908.5	D	almost fresh	44	f	0	5	m	2	6.72								
Cookham	Z28908.6	GJ	fresh	38	p	0	15	b	2	5.65								x
Cookham	Z28908.7	DF	fresh	47	f	0	10	m	1	9.8	x			x		x		
Cookham	Z28920.1	FG	fresh	29	f	1	10	m	2	4.16								
Cookham	Z28920.2	E	not fresh	30	f	0	0	n	2	6.61								
Cookham	Z28920.3	EF	not fresh	28	p	0	5	b	2	3.84								

Cookham	Z28921.1	G	not fresh	33	f	0	5	m	2	4.77		x					x		
Cookham	Z28921.2	G	fresh	32	f	1	10	m	2	6.19							x		
Cookham	Z28921.3	FG	almost fresh	41	f	0	5	m	2	6.05			x				x		
Cookham	Z28922.1	DF	fresh	23	p	0	45	a	0	4.25						x			
Cookham	Z28922.2	G	almost fresh	30	p	1	35	b	0	3.47									
Cookham	Z28922.3	FG	fresh	25	p	0	15	b	1	4.45		x							
Cookham	Z28925.1.1	FM	almost fresh	31	f	0	15	m	2	4.61			x						
Cookham	Z28925.1.10	E	not fresh	31	p	0	10	a	2	3.89									
Cookham	Z28925.1.11	G	almost fresh	25	p	1	10	a	0	3.9									
Cookham	Z28925.1.12	F	fresh	34	p	0	15	a	0	3.97									x
Cookham	Z28925.1.13	FG	fresh	40	f	0	15	m	1	4.69	x								
Cookham	Z28925.1.2	E	almost fresh	40	f	0	5	m	2	5.32									
Cookham	Z28925.1.3	F	fresh	31	p	0	15	b	0	3.79		x							
Cookham	Z28925.1.4	F	almost fresh	36	f	0	5	m	2	3.96									
Cookham	Z28925.1.5	FG	fresh	40	f	0	10	m	0	7.66									
Cookham	Z28925.1.6	F	not fresh	33	p	0	15	b	0	4.39									x
Cookham	Z28925.1.7	EF	fresh	52	p	0	5	a	0	4.35									
Cookham	Z28925.1.8	E	almost fresh	27	f	0	15	m	2	3.34									
Cookham	Z28925.1.9	EF	almost fresh	18	p	0	50	b	0	5.93						x			
Cookham	Z28925.3	F	not fresh	33	p	0	20	a	0	2.61									
Cookham	Z28926.1.1	FM	not fresh	52	f	0	0	n	2	3.29			x						x
Cookham	Z28926.1.2	FM	fresh	36	p	0	20	a	0	7.19	x			x					
Cookham	Z28926.1.3	FG	not fresh	41	f	0	10	m	2	3.45									x
Cookham	Z28926.1.4	GH	almost fresh	37	p	1	20	b	0	6.35									
Cookham	Z28926.1.5	F	not fresh	34	f	0	5	m	2	12.24									x

Cookham	Z28926.1.6	G	almost fresh	37	f	0	0	n	2	4									
Cookham	Z28926.1.7	DF	fresh	33	p	0	10	b	0	9.86	x			x					
Cookham	Z28926.1.8	F	almost fresh	28	f	0	15	a	0	4.79		x							
Cookham	Z28926.2.6	F	fresh	36	p	0	10	b	0	6.48									x
Cookham	Z28926.2.7	F	almost fresh	52	f	0	5	m	2	2.85									x
Cookham	Z28927	F	not fresh	63	p	0	15	a	0	5.75				x					
Cookham	Z28928.2	D	fresh	25	p	0	5	a	0	11.42	x							x	
Cookham	Z28928.3	E	almost fresh	21	p	1	10	b	2	6.43	x								
Cookham	Z28928.4	H	almost fresh	33	p	0	10	b	0	8.03									
Cookham	Z28929.1		rolled	35	f	0	0	n	2										
Cookham	Z28929.2		not fresh	25	f	0	10	m	2										
Cookham	Z28932	F	almost fresh	52	u	1	20	b	0	5									
Cookham	Z28933	D	fresh	16	p	1	35	a	0	7.34						x			
Cookham	Z28934	G	not fresh	48	f	0	10	m	0	6.13									
Cookham	Z28935	F	almost fresh	31	u	0	40	b	0	5.72									
Cookham	Z28962.1	F	almost fresh	46	u	0	0	n	2	2.28									
Cookham	Z28962.2	FG	almost fresh	40	p	0	10	m	2	4.49									x
Cookham	Z28962.3	D	not fresh	37	f	0	15	m	0	3.7						x			
Cookham	Z28963.2	G	almost fresh	39	p	1	15	a	2	3.45		x							
Cookham	Z28966.1	E	fresh	28	p	0	10	a	0	5.08									
Cookham	Z28966.2	H	almost fresh	32	f	0	15	m	2	5.53						x			x
Cookham	Z28967.1	EF	almost fresh	35	f	0	0	n	2	5.47		x	x						
Cookham	Z28967.2	E	almost fresh	29	p	0	15	a	0	5									
Cookham	Z28969.1	F	almost fresh	43	p	0	40	a	0	6.25				x					

Cookham	Z28969.10	F	fresh	26	p	1	25	b	2	8.04									
Cookham	Z28969.11	F	not fresh	24	p	0	10	b	2	2.51									
Cookham	Z28969.12	FM	almost fresh	39	f	0	10	m	2	5.42			x						x
Cookham	Z28969.13	G	fresh	32	p	1	5	a	1	5.31									
Cookham	Z28969.14	F	almost fresh	28	p	0	30	a	2	11.87	x			x					
Cookham	Z28969.15	F	almost fresh	32	p	0	10	a	2	5.54	x								
Cookham	Z28969.16	J	fresh	31	p	0	10	a	0	4.03									
Cookham	Z28969.17	FM	almost fresh	34	p	0	25	b	0	2.46			x						
Cookham	Z28969.2	F	not fresh	34	f	0	0	n	2	3.47									
Cookham	Z28969.3	G	almost fresh	21	u	0	20	a	2	4.86									
Cookham	Z28969.4	F	not fresh	33	f	0	0	n	2	2.49									x
Cookham	Z28969.5	G	almost fresh	33	f	0	0	n	2	5.58									x
Cookham	Z28969.6	FG	not fresh	31	f	0	5	m	2	6.45									x
Cookham	Z28969.7	F	fresh	29	p	0	15	b	2	6.29				x					
Cookham	Z28969.8	E	almost fresh	37	f	0	15	m	2	5.89	x								
Cookham	Z28969.9	E	almost fresh	33	u	0	25	b	0	3.76									
Cookham	Z28985	GH	almost fresh	55	f	0	5	m	0	4.17									
Cookham	Z28987	DF	almost fresh	33	p	0	15	a	2	6.24									
Cookham	Z28988		almost fresh	36	p	0	25	a	2										
Cookham	Z28989	DF	not fresh	45	f	0	10	m	2	6.78									x
Cookham	Z35556	F	not fresh	41	f	0	0	n	2	6.13									x
Cookham	Z68964	F	fresh	31	p	1	5	b	2	6.71									
Cookham	Z68965	E	almost fresh	39	f	0	5	m	2	5.3									

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Cuxton		BM	Cogger	1F10/16.1	93	56	48	24	123	26	29	47	15	21	0.43	0.60	0.28	P	0.62	0.71
Cuxton		BM	Cogger	1F10/19.1	161	77	57	48	539	35	43	76	14	37	0.62	0.48	0.22	P	0.57	0.38
Cuxton		BM	Cogger	1F10/24.1	110	51	49	46	225	40	34	40	17	40	0.90	0.46	0.36	O	0.85	0.43
Cuxton		BM	Cogger	1F10/24.2	145	87	74	51	546	35	50	84	13	51	0.59	0.60	0.24	P	0.60	0.25
Cuxton		BM	Cogger	1F10/24.3	156	85	82	48	553	47	53	70	16	43	0.56	0.54	0.30	P	0.76	0.37
Cuxton		BM	Cogger	1F10/24.4	109	62	48	34	195	15	29	58	9	31	0.55	0.57	0.14	P	0.50	0.29
Cuxton		BM	Cogger	1F10/25.1	166	72	66	59	752	27	58	70	20	48	0.82	0.43	0.16	P	0.83	0.42
Cuxton		BM	Cogger	1F10/25.2	87	54	51	25	131	46	45	50	10	20	0.46	0.62	0.53	O	0.90	0.50
Cuxton	Trench 2	BM	Tester	1F11/14.1	78	41	34	38		32	17	40	15	34	0.93	0.53	0.41	O	0.43	0.44
Cuxton	Trench 4	BM	Tester	1F11/14.2	97	58	54	38		35	35	49	13	34	0.66	0.60	0.36	O	0.71	0.38
Cuxton	Trench 4	BM	Tester	1F11/14.3	79	38	34	39		9	16	37	10	31	1.03	0.48	0.11	P	0.43	0.32
Cuxton	Trench 4	BM	Tester	1F11/14.4	86	55	41	28		27	23	55	7	25	0.51	0.64	0.31	P	0.42	0.28
Cuxton	Trench 1	BM	Tester	1F11/14.5	112	60	51	48		41	31	52	23	48	0.80	0.54	0.37	O	0.60	0.48
Cuxton	Trench 2	BM	Tester	1F11/14.6	122	68	67	35		53	56	61	11	35	0.51	0.56	0.43	O	0.92	0.31
Cuxton	Trench 2	BM	Tester	1F11/14.7	80	57	53	31		32	39	55	11	30	0.54	0.71	0.40	O	0.71	0.37
Cuxton	Trench 2	BM	Tester	1F11/14.8	146	57	48	43		15	41	50	18	31	0.75	0.39	0.10	P	0.82	0.58
Cuxton	Trench 4	BM	Tester	1F11/16.1	103	58	57	44		42	30	50	19	47	0.76	0.56	0.41	O	0.60	0.40
Cuxton	Trench 4	BM	Tester	1F11/16.2	87	54	52	30		35	23	40	9	26	0.56	0.62	0.40	O	0.58	0.35
Cuxton	Trench 4	BM	Tester	1F11/16.3	101	66	61	37		39	39	55	12	25	0.56	0.65	0.39	O	0.71	0.48
Cuxton	Trench 4	BM	Tester	1F11/16.4	111	76	76	33		54	58	63	15	27	0.43	0.68	0.49	O	0.92	0.56
Cuxton	Trench 1	BM	Tester	1F11/16.5	183	89	68	60		44	41	84	16	50	0.67	0.49	0.24	P	0.49	0.32
Cuxton	Trench 4	BM	Tester	1F11/16.6	106	61	61	48		52	39	41	9	44	0.79	0.58	0.49	O	0.95	0.20
Cuxton	Trench 1	BM	Tester	1F11/17.1	137	82	74	49		23	50	79	19	46	0.60	0.60	0.17	P	0.63	0.41
Cuxton	Trench 2	BM	Tester	1F11/17.2	113	64	61	50		36	37	56	17	45	0.78	0.57	0.32	P	0.66	0.38
Cuxton	Trench 1	BM	Tester	1F11/17.3	107	67	64	46		63	50	49	15	41	0.69	0.63	0.59	C	1.02	0.37
Cuxton		BM	Tester	1F11/17.4	121	78	63	49		9	40	77	9	47	0.63	0.64	0.07	P	0.52	0.19
Cuxton	Trench 4	BM	Tester	1F11/17.5	132	78	66	56		25	34	78	22	47	0.72	0.59	0.19	P	0.44	0.47

Cuxton	Trench 2	BM	Tester	1F11/18.1	210	76	49	61	645	63	31	71	15	56	0.80	0.36	0.30	P	0.44	0.27
Cuxton	Trench 4	BM	Tester	1F11/18.2	152	82	76	54	613	61	48	66	19	55	0.66	0.54	0.40	O	0.73	0.35
Cuxton	Trench 1	BM	Tester	1F11/18.3	125	71	52	42	306	37	35	62	14	38	0.59	0.57	0.30	P	0.56	0.37
Cuxton	Trench 4	BM	Tester	1F11/18.4	92	64	56	39	196	27	32	59	21	30	0.61	0.70	0.29	P	0.54	0.70
Cuxton	Trench 2	BM	Tester	1F11/19.1	148	70	61	50	435	42	29	68	8	36	0.71	0.47	0.28	P	0.43	0.22
Cuxton	Trench 4	BM	Tester	1F11/19.2	159	92	76	42	593	64	45	85	20	29	0.46	0.58	0.40	O	0.53	0.69
Cuxton	Trench 4	BM	Tester	1F11/19.3	127	67	65	46	366	61	38	64	9	45	0.69	0.53	0.48	O	0.59	0.20
Cuxton	Trench 2	BM	Tester	1F11/19.4	166	107	103	51	867	63	78	94	16	47	0.48	0.64	0.38	O	0.83	0.34
Cuxton	Trench 4	BM	Tester	1F11/19.5	110	69	61	38	304	24	54	69	15	29	0.55	0.63	0.22	P	0.78	0.52
Cuxton	Trench 4	BM	Tester	1F11/20.1	97	59	50	27	110	29	33	49	12	20	0.46	0.61	0.30	P	0.67	0.60
Cuxton	Trench 2	BM	Tester	1F11/20.2	132	64	46	38	265	36	28	61	21	32	0.59	0.48	0.27	P	0.46	0.66
Cuxton	Trench 4	BM	Tester	1F11/20.3	95	57	55	23	131	31	26	54	9	23	0.40	0.60	0.33	P	0.48	0.39
Cuxton	Trench 2	BM	Tester	1F11/20.4	115	60	52	47	227	43	25	52	11	39	0.78	0.52	0.37	O	0.48	0.28
Cuxton	Trench 4	BM	Tester	1F11/20.5	89	58	54	28	157	30	33	46	10	26	0.48	0.65	0.34	P	0.72	0.38
Cuxton	Trench 2	BM	Tester	1F11/20.6	122	61	44	36	186	36	26	59	10	33	0.59	0.50	0.30	P	0.44	0.30
Cuxton	Trench 2	BM	Tester	1F11/20.7	122	81	64	37	307	35	29	67	17	35	0.46	0.66	0.29	P	0.43	0.49
Cuxton	Trench 1	BM	Tester	1F11/20.8	158	83	69	47	595	36	45	76	17	45	0.57	0.53	0.23	P	0.59	0.38
Cuxton	Trench 2	BM	Tester	1F11/21.1	112	70	53	32	216	29	28	67	14	32	0.46	0.63	0.26	P	0.42	0.44
Cuxton	Trench 4	BM	Tester	1F11/21.2	163	83	72	49	536	40	40	77	14	45	0.59	0.51	0.25	P	0.52	0.31
Cuxton	Trench 1	BM	Tester	1F11/21.3	89	58	55	36	113	39	38	49	11	28	0.62	0.65	0.44	O	0.78	0.39
Cuxton	Trench 1	BM	Tester	1F11/21.4	90	54	40	40	122	26	25	43	9	26	0.74	0.60	0.29	P	0.58	0.35
Cuxton	Trench 4	BM	Tester	1F11/21.5	71	54	44	27	113	16	26	54	15	21	0.50	0.76	0.23	P	0.48	0.71
Cuxton	Trench 4	BM	Tester	1F11/21.6	106	78	42	36	230	19	25	78	17	29	0.46	0.74	0.18	P	0.32	0.59
Cuxton	Trench 4	BM	Tester	1F11/21.7	130	71	54	44	268	42	27	40	10	26	0.62	0.55	0.32	P	0.68	0.38
Cuxton	Trench 4	BM	Tester	1F11/22.1	125	74	73	38	295	59	48	58	12	28	0.51	0.59	0.47	O	0.83	0.43
Cuxton	Trench 4	BM	Tester	1F11/22.2	147	66	52	72	524	42	38	61	19	70	1.09	0.45	0.29	P	0.62	0.27
Cuxton	Trench 1	BM	Tester	1F11/22.3	161	101	101	52	737	81	79	91	15	37	0.51	0.63	0.50	O	0.87	0.41
Cuxton	Trench 1	BM	Tester	1F11/22.4	117	75	66	56	471	43	41	68	21	46	0.75	0.64	0.37	O	0.60	0.46
Cuxton	Trench 2	BM	Tester	1F11/22.5	81	59	58	21	104	29	44	47	7	16	0.36	0.73	0.36	O	0.94	0.44
Cuxton	Trench 2	BM	Tester	1F11/23.1	188	109	106	51	1183	72	86	72	25	45	0.47	0.58	0.38	O	1.19	0.56
Cuxton	Trench 2	BM	Tester	1F11/23.2	194	98	54	66	937	19	35	92	20	65	0.67	0.51	0.10	P	0.38	0.31

Cuxton	Trench 1	BM	Tester	1F11/23.3	193	86	81	61	807	66	39	66	22	41	0.71	0.45	0.34	P	0.59	0.54
Cuxton	Trench 4	BM	Tester	1F11/24.1	96	60	52	39	196	18	33	54	11	33	0.65	0.63	0.19	P	0.61	0.33
Cuxton	Trench 2	BM	Tester	1F11/24.2	137	57	47	45	296	49	33	49	15	29	0.79	0.42	0.36	O	0.67	0.52
Cuxton	Trench 4	BM	Tester	1F11/24.3	166	90	89	59	750	60	73	80	13	55	0.66	0.54	0.36	O	0.91	0.24
Cuxton	Trench 4	BM	Tester	1F11/24.4	177	96	96	67	998	89	68	88	16	58	0.70	0.54	0.50	O	0.77	0.28
Cuxton	Trench 4	BM	Tester	1F11/24.5	108	63	51	44	257	23	29	57	20	29	0.70	0.58	0.21	P	0.51	0.69
Cuxton	Trench 4	BM	Tester	1F11/25.1	121	66	64	38	293	71	42	63	9	35	0.58	0.55	0.59	C	0.67	0.26
Cuxton	Trench 1	BM	Tester	1F11/25.2	122	69	56	38	286	28	6	35	15	35	0.55	0.57	0.23	P	0.17	0.43
Cuxton	Trench 4	BM	Tester	1F11/25.3	131	68	63	55	352	43	37	59	17	39	0.81	0.52	0.33	P	0.63	0.44
Cuxton	Trench 4	BM	Tester	1F11/25.4	133	82	68	44	377	33	39	81	14	43	0.54	0.62	0.25	P	0.48	0.33
Cuxton	Trench 2	BM	Tester	1F11/25.5	137	79	65	52	427	41	44	67	13	47	0.66	0.58	0.30	P	0.66	0.28
Cuxton	Trench 4	BM	Tester	1F11/25.6	104	61	60	33	183	38	33	57	10	28	0.54	0.59	0.37	O	0.58	0.36
Cuxton	Trench 4	BM	Tester	1F11/26.1	137	70	67	39	354	26	48	66	16	36	0.56	0.51	0.19	P	0.73	0.44
Cuxton	Trench 4	BM	Tester	1F11/26.2	105	67	67	36	293	46	50	65	11	36	0.54	0.64	0.44	O	0.77	0.31
Cuxton	Trench 1	BM	Tester	1F11/26.3	166	86	86	52	685	84	63	68	16	37	0.60	0.52	0.51	O	0.93	0.43
Cuxton	Trench 4	BM	Tester	1F11/26.4	140	77	74	37	365	54	54	62	15	37	0.48	0.55	0.39	O	0.87	0.41
Cuxton	Trench 4	BM	Tester	1F11/26.5	135	69	67	30	314	58	51	61	18	25	0.43	0.51	0.43	O	0.84	0.72
Cuxton	Trench 4	BM	Tester	1F12/10.1	108	68	37	43	268	31	46	50	10	40	0.63	0.63	0.29	P	0.92	0.25
Cuxton	Trench 4	BM	Tester	1F12/10.2	117	74	72	54	385	41	48	52	14	35	0.73	0.63	0.35	O	0.92	0.40
Cuxton	Trench 1	BM	Tester	1F12/10.3	104	64	62	34	218	34	42	59	14	26	0.53	0.62	0.33	P	0.71	0.54
Cuxton	Trench 2	BM	Tester	1F12/10.4	142	92	92	35	499	70	70	72	15	36	0.38	0.65	0.49	O	0.97	0.42
Cuxton	Trench 4	BM	Tester	1F12/10.5	142	79	66	50	356	31	40	65	10	31	0.63	0.56	0.22	P	0.62	0.32
Cuxton	Trench 2	BM	Tester	1F12/10.6	101	67	63	27	159	48	42	55	8	26	0.40	0.66	0.48	O	0.76	0.31
Cuxton	Trench 4	BM	Tester	1F12/10.8	107	69	66	30	196	46	46	59	10	17	0.43	0.64	0.43	O	0.78	0.59
Cuxton	Trench 4	BM	Tester	1F12/11.2	128	85	81	47	459	35	57	76	16	37	0.55	0.66	0.27	P	0.75	0.43
Cuxton	Trench 1	BM	Tester	1F12/11.3	137	86	80	50	465	46	38	66	13	42	0.58	0.63	0.34	P	0.58	0.31
Cuxton	Trench 4	BM	Tester	1F12/11.4	147	61	47	55	373	26	29	58	10	50	0.90	0.41	0.18	P	0.50	0.20
Cuxton	Trench 4	BM	Tester	1F12/11.5	124	75	67	43	339	25	45	72	15	29	0.57	0.60	0.20	P	0.63	0.52
Cuxton	Trench 4	BM	Tester	1F12/11.6	104	70	67	46	271	20	38	70	9	39	0.66	0.67	0.19	P	0.54	0.23
Cuxton	Trench 4	BM	Tester	1F12/11.7	110	75	56	36	271	24	35	74	18	30	0.48	0.68	0.22	P	0.47	0.60
Cuxton	Trench 1	BM	Tester	1F12/12.1	149	83	82	53	540	67	64	64	15	51	0.64	0.56	0.45	O	1.00	0.29

Cuxton	Trench 4	BM	Tester	1F12/12.2	68	47	44	25	69	23	28	41	12	23	0.53	0.69	0.34	P	0.68	0.52
Cuxton	Trench 4	BM	Tester	1F12/12.3	72	34	30	24	59	24	16	31	12	23	0.71	0.47	0.33	P	0.52	0.52
Cuxton	Trench 4	BM	Tester	1F12/12.4	81	45	38	38	114	23	23	38	18	30	0.84	0.56	0.28	P	0.61	0.60
Cuxton	Trench 4	BM	Tester	1F12/12.5	80	51	48	18	91	25	37	49	12	16	0.35	0.64	0.31	P	0.76	0.75
Cuxton	Trench 2	BM	Tester	1F12/12.6	133	92	91	43	490	55	54	76	21	38	0.47	0.69	0.41	O	0.71	0.55
Cuxton	Trench 2	BM	Tester	1F12/12.7	99	56	56	42	254	63	48	41	14	34	0.75	0.57	0.64	C	1.17	0.41
Cuxton	Trench 4	BM	Tester	1F12/12.8	84	54	39	37	160	13	28	54	13	23	0.69	0.64	0.15	P	0.52	0.57
Cuxton	Trench 4	BM	Tester	1F12/12.9	123	69	47	41	249	23	17	65	13	37	0.59	0.56	0.19	P	0.26	0.35
Cuxton	Trench 4	BM	Tester	1F12/13.1	89	51	45	28	119	28	27	43	15	24	0.55	0.57	0.31	P	0.63	0.63
Cuxton	Trench 1	BM	Tester	1F12/13.2	115	68	47	28	197	18	23	68	13	22	0.41	0.59	0.16	P	0.34	0.59
Cuxton	Trench 1	BM	Tester	1F12/13.3	117	71	38	51	305	20	30	68	10	44	0.72	0.61	0.17	P	0.44	0.23
Cuxton	Trench 4	BM	Tester	1F12/13.4	90	43	42	34	125	25	31	41	17	26	0.79	0.48	0.28	P	0.76	0.65
Cuxton	Trench 4	BM	Tester	1F12/13.5	162	94	90	59	213	71	64	69	14	34	0.63	0.58	0.44	O	0.93	0.41
Cuxton	Trench 4	BM	Tester	1F12/13.6	88	68	52	43	666	19	35	65	13	36	0.63	0.77	0.22	P	0.54	0.36
Cuxton	Trench 3	BM	Tester	1F12/13.7	84	65	60	21	118	34	36	53	10	15	0.32	0.77	0.40	O	0.68	0.67
Cuxton	Trench 4	BM	Tester	1F12/13.8	75	48	44	21	82	23	30	46	9	17	0.44	0.64	0.31	P	0.65	0.53
Cuxton	Trench 4	BM	Tester	1F12/13.9	74	51	49	21	73	34	32	45	6	15	0.41	0.69	0.46	O	0.71	0.40
Cuxton	Trench 3	BM	Tester	1F12/14.1	123	65	57	52	315	31	39	56	12	44	0.80	0.53	0.25	P	0.70	0.27
Cuxton	Trench 2	BM	Tester	1F12/14.2	84	63	57	21	136	20	45	57	16	17	0.33	0.75	0.24	P	0.79	0.94
Cuxton	Trench 1	BM	Tester	1F12/14.3	149	81	71	39	419	53	48	60	20	37	0.48	0.54	0.36	O	0.80	0.54
Cuxton	Trench 4	BM	Tester	1F12/14.4	112	66	57	18	138	29	33	59	9	9	0.27	0.59	0.26	P	0.56	1.00
Cuxton	Trench 4	BM	Tester	1F12/2.1	249	105	64	60	1117	44	40	100	21	51	0.57	0.42	0.18	P	0.40	0.41
Cuxton	Trench 2	BM	Tester	1F12/2.2	254	80	72	62	1185	27	45	68	19	51	0.78	0.31	0.11	P	0.66	0.37
Cuxton	Trench 4	BM	Tester	1F12/2.3	140	63	57	52	336	53	31	53	18	37	0.83	0.45	0.38	O	0.58	0.49
Cuxton	Trench 4	BM	Tester	1F12/2.4	122	73	68	49	399	69	62	59	17	41	0.67	0.60	0.57	C	1.05	0.41
Cuxton	Trench 4	BM	Tester	1F12/23.1	109	66	65	44	297	46	40	43	25	38	0.67	0.61	0.42	O	0.93	0.66
Cuxton	Trench 4	BM	Tester	1F12/23.2	83	56	54	34	163	21	22	56	22	26	0.61	0.67	0.25	P	0.39	0.85
Cuxton	Trench 4	BM	Tester	1F12/23.3	109	65	63	50	317	41	41	53	27	45	0.77	0.60	0.38	O	0.77	0.60
Cuxton	Trench 4	BM	Tester	1F12/23.4	139	71	66	52	408	53	40	51	31	33	0.73	0.51	0.38	O	0.78	0.94
Cuxton	Trench 4	BM	Tester	1F12/23.5	102	68	53	37	212	33	32	59	15	30	0.54	0.67	0.32	P	0.54	0.50
Cuxton	Trench 4	BM	Tester	1F12/23.6	87	66	61	36	204	31	46	50	19	29	0.55	0.76	0.36	O	0.92	0.66

Cuxton	Trench 4	BM	Tester	1F12/23.7	151	87	69	53	653	24	44	86	26	49	0.61	0.58	0.16	P	0.51	0.53
Cuxton	Trench 1	BM	Tester	1F12/24.2	95	54	49	36	179	19	34	54	15	32	0.67	0.57	0.20	P	0.63	0.47
Cuxton	Trench 1	BM	Tester	1F12/24.3	83	58	39	24	101	7	21	55	13	22	0.41	0.70	0.08	P	0.38	0.59
Cuxton	Trench 4	BM	Tester	1F12/24.4	208	92	54	61	969	27	37	79	24	61	0.66	0.44	0.13	P	0.47	0.39
Cuxton	Trench 2	BM	Tester	1F12/24.5	164	75	41	40	327	34	18	74	13	34	0.53	0.46	0.21	P	0.24	0.38
Cuxton	Trench 1	BM	Tester	1F12/25.1	93	51	45	27	127	38	37	46	10	20	0.53	0.55	0.41	O	0.80	0.50
Cuxton	Trench 4	BM	Tester	1F12/25.2	92	51	48	28	135	22	35	48	12	26	0.55	0.55	0.24	P	0.73	0.46
Cuxton	Trench 4	BM	Tester	1F12/25.3	76	62	61	28	130	34	35	55	14	23	0.45	0.82	0.45	O	0.64	0.61
Cuxton	Trench 4	BM	Tester	1F12/25.4	200	93	90	51	1120	111	73	77	21	40	0.55	0.47	0.56	C	0.95	0.53
Cuxton	Trench 4	BM	Tester	1F12/25.5	102	64	58	40	214	42	38	43	11	35	0.63	0.63	0.41	O	0.88	0.31
Cuxton	Trench 4	BM	Tester	1F12/25.6	81	49	40	35	92	23	22	41	9	27	0.71	0.60	0.28	P	0.54	0.33
Cuxton	Trench 4	BM	Tester	1F12/25.7	128	64	57	53	320	49	38	54	16	40	0.83	0.50	0.38	O	0.70	0.40
Cuxton	Trench 1	BM	Tester	1F12/25.8	121	61	47	30	189	31	33	58	11	28	0.49	0.50	0.26	P	0.57	0.39
Cuxton	Trench 1	BM	Tester	1F12/26.1	132	58	54	51	347	76	42	46	19	41	0.88	0.44	0.58	C	0.91	0.46
Cuxton	Trench 3	BM	Tester	1F12/26.2	146	77	74	44	527	70	59	66	16	43	0.57	0.53	0.48	O	0.89	0.37
Cuxton	Trench 4	BM	Tester	1F12/26.3	161	100	95	46	761	67	49	81	23	37	0.46	0.62	0.42	O	0.60	0.62
Cuxton	Trench 1	BM	Tester	1F12/26.4	115	77	74	39	352	43	68	67	18	26	0.51	0.67	0.37	O	1.01	0.69
Cuxton	Trench 2	BM	Tester	1F12/26.5	122	78	61	31	262	29	38	74	13	28	0.40	0.64	0.24	P	0.51	0.46
Cuxton	Trench 4	BM	Tester	1F12/3.1	188	91	51	51	668	40	36	89	14	51	0.56	0.48	0.21	P	0.40	0.27
Cuxton	Trench 1	BM	Tester	1F12/3.2	171	85	68	43	534	31	31	84	16	35	0.51	0.50	0.18	P	0.37	0.46
Cuxton	Trench 2	BM	Tester	1F12/3.3	88	75	60	50	328	21	40	74	23	29	0.67	0.85	0.24	P	0.54	0.79
Cuxton	Trench 4	BM	Tester	1F12/3.4	178	101	93	67	1004	63	70	96	21	63	0.66	0.57	0.35	O	0.73	0.33
Cuxton	Trench 4	BM	Tester	1F12/4.1	128	61	60	34	227	40	50	52	13	12	0.56	0.48	0.31	P	0.96	1.08
Cuxton	Trench 1	BM	Tester	1F12/4.2	77	41	27	19	42	17	14	38	5	16	0.46	0.53	0.22	P	0.37	0.31
Cuxton	Trench 4	BM	Tester	1F12/4.3	98	61	48	43	185	27	30	59	11	39	0.70	0.62	0.28	P	0.51	0.28
Cuxton	Trench 4	BM	Tester	1F12/4.4	103	65	64	43	263	48	49	48	11	35	0.66	0.63	0.47	O	1.02	0.31
Cuxton	Trench 2	BM	Tester	1F12/4.5	143	72	65	33	313	49	33	67	14	27	0.46	0.50	0.34	P	0.49	0.52
Cuxton	Trench 1	BM	Tester	1F12/4.6	82	55	54	28	124	41	49	46	11	14	0.51	0.67	0.50	O	1.07	0.79
Cuxton	Trench 4	BM	Tester	1F12/4.7	108	70	50	36	210	18	30	69	10	33	0.51	0.65	0.17	P	0.43	0.30
Cuxton	Trench 4	BM	Tester	1F12/4.8	104	59	55	32	241	63	35	47	14	30	0.54	0.57	0.61	C	0.74	0.47
Cuxton	Trench 4	BM	Tester	1F12/5.1	94	56	56	30	151	45	46	41	16	22	0.54	0.60	0.48	O	1.12	0.73

Cuxton	Trench 4	BM	Tester	1F12/5.2	147	85	81	59	558	57	59	62	16	40	0.69	0.58	0.39	O	0.95	0.40
Cuxton	Trench 1	BM	Tester	1F12/5.3	87	43	38	33	135	20	33	38	13	28	0.77	0.49	0.23	P	0.87	0.46
Cuxton	Trench 4	BM	Tester	1F12/5.4	81	45	42	30	112	30	30	45	8	27	0.67	0.56	0.37	P	0.67	0.30
Cuxton	Trench 4	BM	Tester	1F12/6.1	90	60	49	43	215	25	35	59	12	41	0.72	0.67	0.28	P	0.59	0.29
Cuxton	Trench 2	BM	Tester	1F12/6.2	108	85	83	38	388	51	64	66	26	26	0.45	0.79	0.47	O	0.97	1.00
Cuxton	Trench 4	BM	Tester	1F12/6.3	104	64	59	37	195	33	34	46	11	34	0.58	0.62	0.32	P	0.74	0.32
Cuxton	Trench 4	BM	Tester	1F12/6.4	103	60	57	52	231	20	34	55	12	37	0.87	0.58	0.19	P	0.62	0.32
Cuxton	Trench 1	BM	Tester	1F12/6.5	129	67	44	36	230	24	30	65	10	32	0.54	0.52	0.19	P	0.46	0.31
Cuxton	Trench 4	BM	Tester	1F12/6.6	185	105	103	41	717	96	90	64	23	45	0.39	0.57	0.52	O	1.41	0.51
Cuxton	Trench 4	BM	Tester	1F12/6.7	116	58	52	45	301	39	25	52	22	36	0.78	0.50	0.34	P	0.48	0.61
Cuxton	Trench 4	BM	Tester	1F12/7.2	119	58	54	40	227	32	41	56	16	34	0.69	0.49	0.27	P	0.73	0.47
Cuxton	Trench 1	BM	Tester	1F12/7.3	69	52	45	28	86	25	16	46	11	14	0.54	0.75	0.36	O	0.35	0.79
Cuxton	Trench 1	BM	Tester	1F12/7.4	124	90	89	49	432	59	59	78	17	41	0.54	0.73	0.48	O	0.76	0.41
Cuxton	Trench 1	BM	Tester	1F12/7.5	130	74	43	36	275	26	29	74	12	36	0.49	0.57	0.20	P	0.39	0.33
Cuxton	Trench 4	BM	Tester	1F12/7.7	148	82	79	46	449	48	52	61	11	44	0.56	0.55	0.32	P	0.85	0.25
Cuxton	Trench 4	BM	Tester	1F12/7.8	92	66	49	29	139	13	26	64	11	27	0.44	0.72	0.14	P	0.41	0.41
Cuxton	Trench 4	BM	Tester	1F12/7.9	67	48	35	20	61	15	21	46	9	14	0.42	0.72	0.22	P	0.46	0.64
Cuxton	Trench 1	BM	Tester	1F12/8.1	165	115	108	59	1231	43	79	102	32	52	0.51	0.70	0.26	P	0.77	0.62
Cuxton	Trench 1	BM	Tester	1F12/8.2	107	70	59	45	274	28	42	69	16	35	0.64	0.65	0.26	P	0.61	0.46
Cuxton	Trench 1	BM	Tester	1F12/8.3	123	92	87	43	526	34	63	89	24	30	0.47	0.75	0.28	P	0.71	0.80
Cuxton	Trench 2	BM	Tester	1F12/8.6	94	73	71	39	273	41	55	63	24	27	0.53	0.78	0.44	O	0.87	0.89
Cuxton	Trench 1	BM	Tester	1F12/9.1	156	85	69	61	738	59	30	75	15	54	0.72	0.54	0.38	O	0.40	0.28
Cuxton	Trench 4	BM	Tester	1F12/9.2	121	68	38	44	229	20	24	67	10	41	0.65	0.56	0.17	P	0.36	0.24
Cuxton	Trench 4	BM	Tester	1F12/9.3	126	80	71	34	321	38	39	62	19	31	0.43	0.63	0.30	P	0.63	0.61
Cuxton	Trench 4	BM	Tester	1F12/9.4	177	94	87	52	782	95	77	68	19	41	0.55	0.53	0.54	O	1.13	0.46
Cuxton	Trench 4	BM	Tester	1F12/9.5	94	51	44	36	149	34	28	39	10	35	0.71	0.54	0.36	O	0.72	0.29
Cuxton	Trench 4	BM	Tester	1F12/9.6	80	56	50	25	110	16	31	56	11	21	0.45	0.70	0.20	P	0.55	0.52
Cuxton	Trench 4	BM	Tester	1F13/1.1	143	77	73	47	475	51	52	72	12	41	0.61	0.54	0.36	O	0.72	0.29
Cuxton	Trench 2	BM	Tester	1F13/1.2	214	105	74	56	1003	41	47	105	17	54	0.53	0.49	0.19	P	0.45	0.31
Cuxton	Trench 4	BM	Tester	1F13/1.3	124	56	50	33	192	46	28	41	12	22	0.59	0.45	0.37	O	0.68	0.55
Cuxton	Trench 2	BM	Tester	1F13/1.4	131	79	74	36	469	75	70	75	15	37	0.46	0.60	0.57	C	0.93	0.41

Cuxton	Trench 4	BM	Tester	1F13/2.1	154	78	72	44	408	46	41	66	9	34	0.56	0.51	0.30	P	0.62	0.26
Cuxton	Trench 2	BM	Tester	1F13/2.2	201	103	89	48	893	40	65	102	18	37	0.47	0.51	0.20	P	0.64	0.49
Cuxton	Trench 2	BM	Tester	1F13/2.3	140	80	75	43	429	40	50	76	11	43	0.54	0.57	0.29	P	0.66	0.26
Cuxton	Trench 2	BM	Tester	1F13/25.1	108	69	55	39	271	27	38	65	16	36	0.57	0.64	0.25	P	0.58	0.44
Cuxton	Trench 2	BM	Tester	1F13/25.2	130	88	82	38	465	51	58	73	21	28	0.43	0.68	0.39	O	0.79	0.75
Cuxton	Trench 2	BM	Tester	1F13/25.3	139	87	56	56	468	27	37	86	21	56	0.64	0.63	0.19	P	0.43	0.38
Cuxton	Trench 2	BM	Tester	1F13/25.4	151	89	85	44	536	64	66	76	18	43	0.49	0.59	0.42	O	0.87	0.42
Cuxton	Trench 2	BM	Tester	1F13/26.1	130	88	75	33	411	35	52	81	19	27	0.38	0.68	0.27	P	0.64	0.70
Cuxton	Trench 2	BM	Tester	1F13/26.2	155	99	71	71	865	31	43	99	30	66	0.72	0.64	0.20	P	0.43	0.45
Cuxton	Trench 2	BM	Tester	1F13/26.3	92	74	73	32	243	33	57	63	14	24	0.43	0.80	0.36	O	0.90	0.58
Cuxton	Trench 1	BM	Tester	1F13/3.1	162	88	64	39	488	23	43	86	15	36	0.44	0.54	0.14	P	0.50	0.42
Cuxton	Trench 2	BM	Tester	1F13/3.2	233	99	51	53	837	39	35	91	13	53	0.54	0.42	0.17	P	0.38	0.25
Cuxton	Trench 2	BM	Tester	1F14/2.1	175	106	84	56	1033	71	67	78	23	54	0.53	0.61	0.41	O	0.86	0.43
Cuxton	Trench 2	BM	Tester	1F14/2.2	120	99	83	52	616	46	69	78	29	49	0.53	0.83	0.38	O	0.88	0.59
Cuxton	Trench 2	BM	Tester	1F14/2.3	94	79	78	40	374	39	68	75	27	35	0.51	0.84	0.41	O	0.91	0.77

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Cuxton	1F10/16.1	GJ	almost fresh	41	F	0	0	N	1	4.55									
Cuxton	1F10/19.1	FM	fresh	54	F	0	10	M	2	3.18			x						
Cuxton	1F10/24.1	F	not fresh	24	U	0	10	B	2	6.9									x
Cuxton	1F10/24.2	FG	almost fresh	42	U	0	10	B	2	4.86		x							
Cuxton	1F10/24.3	G	almost fresh	57	P	0	30	A	0	8.75	x					x			
Cuxton	1F10/24.4	F	fresh	29	U	0	15	B	2	7.12									
Cuxton	1F10/25.1	D	fresh	41	P	0	35	A	0	4.1						x			x
Cuxton	1F10/25.2	HK	almost fresh	32	F	0	0	N	2	7.61									
Cuxton	1F11/14.1	EF	almost fresh	21	U	0	45	A	0	11.51				x		x			
Cuxton	1F11/14.2	G	fresh	24	P	0	30	B	0	5.17									
Cuxton	1F11/14.3	E	almost fresh	25	P	0	10	B	0	5.78				x					
Cuxton	1F11/14.4	EF	almost fresh	29	F	0	0	N	2	4.9				x					
Cuxton	1F11/14.5	D	fresh	18	U	0	60	A	0	9.59						x			
Cuxton	1F11/14.6	HK	fresh	45	F	1	5	M	0	6.36						x			
Cuxton	1F11/14.7	G	fresh	45	F	1	5	M	2	2.95									
Cuxton	1F11/14.8	F	fresh	25	P	1	40	A	0	8.81						x			
Cuxton	1F11/16.1	DF	almost fresh	36	F	0	25	M	2	5.12								x	
Cuxton	1F11/16.2	E	almost fresh	21	U	0	25	B	2	12.73							x		
Cuxton	1F11/16.3	G	almost fresh	22	U	0	30	B	0	7.18						x			
Cuxton	1F11/16.4	HK	fresh	34	F	1	5	N	2	5.77									

Cuxton	1F11/16.5	F	almost fresh	52	P	0	10	B	2	3.32								
Cuxton	1F11/16.6	D	almost fresh	24	P	0	45	A	2	11.04					x			
Cuxton	1F11/17.1	F	almost fresh	41	P	0	5	B	2	5.94								
Cuxton	1F11/17.2	DK	almost fresh	21	U	0	50	B	0	2.83								
Cuxton	1F11/17.3	H	almost fresh	29	F	0	5	M	0	6.19								
Cuxton	1F11/17.4	F	fresh	39	F	0	10	M	0	5.1		x						
Cuxton	1F11/17.5	FM	almost fresh	32	P	0	15	A	0	3.89				x				
Cuxton	1F11/18.1	FM	fresh	47	P	1	25	B	0	3.57								
Cuxton	1F11/18.2	D	almost fresh	26	P	0	60	A	0	12.55	x				x			
Cuxton	1F11/18.3	F	fresh	50	P	0	35	B	0	5.56	x				x			
Cuxton	1F11/18.4	E	fresh	23	U	0	15	B	0	7.93								
Cuxton	1F11/19.1	F	fresh	36	P	0	5	A	2	4.33						x		
Cuxton	1F11/19.2	FM	almost fresh	34	P	0	40	A	0	6.02				x				x
Cuxton	1F11/19.3	G	fresh	34	P	0	10	B	2	4.73		x					x	
Cuxton	1F11/19.4	HK	fresh	70	F	0	0	N	2	2.8							x	
Cuxton	1F11/19.5	L	fresh	39	P	0	15	A	2	6.26					x			
Cuxton	1F11/20.1	EF	almost fresh	21	U	0	15	B	2	5.3			x					
Cuxton	1F11/20.2	M	fresh	38	P	0	5	B	2	3.06			x					
Cuxton	1F11/20.3	F	almost fresh	28	U	0	35	A	0	4.21		x						
Cuxton	1F11/20.4	DF	fresh	19	P	0	35	A	0	6.1					x			
Cuxton	1F11/20.5	E	fresh	34	P	0	15	B	2	9.18								
Cuxton	1F11/20.6	FM	almost fresh	29	P	0	15	B	2	7.81				x				
Cuxton	1F11/20.7	DF	not fresh	38	F	0	0	N	2	5.06			x			x		

Cuxton	1F11/20.8	F	almost fresh	39	P	0	30	A	0	4.77				x		
Cuxton	1F11/21.1	F	not fresh	35	F	0	0	N	2	2.53						
Cuxton	1F11/21.2	F	almost fresh	48	F	0	5	M	2	9.04					x	
Cuxton	1F11/21.3	G	almost fresh	31	P	0	10	A	2	7.08					x	
Cuxton	1F11/21.4	EF	fresh	25	P	0	15	A	2	3.89	x					
Cuxton	1F11/21.5	E	fresh	19	F	0	10	M	2	3.54						
Cuxton	1F11/21.6	M	almost fresh	39	P	0	10	A	0	2.4		x				
Cuxton	1F11/21.7	DF	almost fresh	16	U	0	40	B	0	5.75				x		
Cuxton	1F11/22.1	FG	fresh	27	P	0	20	A	2	11.43					x	
Cuxton	1F11/22.2	F	not fresh	30	P	0	20	B	2	5.76						x
Cuxton	1F11/22.3	HK	fresh	51	P	0	20	B	2	4.84						
Cuxton	1F11/22.4	D	almost fresh	17	U	0	30	A	2	4.05						
Cuxton	1F11/22.5	K	almost fresh	19	P	0	20	B	1	7.32				x		
Cuxton	1F11/23.1	L	almost fresh	48	P	0	45	A	2	10.82				x		
Cuxton	1F11/23.2	DF	fresh	52	P	0	20	A	0	2.62			x			
Cuxton	1F11/23.3	DF	almost fresh	27	U	0	40	A	0	8.79				x		
Cuxton	1F11/24.1	E	almost fresh	21	P	0	35	B	0	11.24	x					
Cuxton	1F11/24.2	F	fresh	39	P	0	40	A	0	5.09				x		
Cuxton	1F11/24.3	HK	fresh	61	F	0	5	A	2	3.13						
Cuxton	1F11/24.4	G	almost fresh	37	P	0	35	A	2	7.05	x					
Cuxton	1F11/24.5	DF	fresh	47	F	0	0	N	2	4.45						
Cuxton	1F11/25.1	G	almost fresh	33	P	0	20	B	2	3.19	x					
Cuxton	1F11/25.2	F	almost fresh	35	P	0	5	B	2	3.74						

Cuxton	1F11/25.3	D	fresh	44	P	0	15	B	2	7.77	x				
Cuxton	1F11/25.4	F	fresh	35	P	0	10	A	0	2.18					
Cuxton	1F11/25.5	G	fresh	25	P	0	20	A	2	5.22					x
Cuxton	1F11/25.6	J	almost fresh	24	P	1	5	A	2	6.2					
Cuxton	1F11/26.1	FG	fresh	51	P	0	20	A	0	5.25					
Cuxton	1F11/26.2	H	fresh	33	P	0	25	B	0	9.95					
Cuxton	1F11/26.3	GK	fresh	39	P	0	15	B	2	4.64					
Cuxton	1F11/26.4	GK	fresh	48	F	0	15	M	2	2.49					
Cuxton	1F11/26.5	HK	almost fresh	42	F	1	20	M	2	6.07					
Cuxton	1F12/10.1	GJ	almost fresh	42	F	0	0	N	1	7.69					x
Cuxton	1F12/10.2	G	not fresh	22	P	0	25	M	2	4.1				x	
Cuxton	1F12/10.3	GJ	almost fresh	39	F	0	0	N	2	3.62		x			
Cuxton	1F12/10.4	GH	fresh	45	F	0	10	B	2	8.83					x
Cuxton	1F12/10.5	F	almost fresh	38	P	1	5	B	2	6.16					
Cuxton	1F12/10.6	GK	fresh	27	F	0	0	N	2	6.03		x			
Cuxton	1F12/10.8	GH	fresh	26	F	0	0	N	1	4.45					
Cuxton	1F12/11.2	GK	fresh	55	P	0	5	B	2	5.18					
Cuxton	1F12/11.3	DF	fresh	45	P	0	10	A	2	8.08	x				
Cuxton	1F12/11.4	F	almost fresh	46	P	0	10	B	2	9.04					
Cuxton	1F12/11.5	G	fresh	41	F	0	20	M	2	2.76					
Cuxton	1F12/11.6	FG	fresh	42	P	0	5	B	2	12.29			x		
Cuxton	1F12/11.7	F	almost fresh	46	F	0	0	N	2	8.49					
Cuxton	1F12/12.1	HK	fresh	50	P	0	25	M	0	3.66				x	

Cuxton	1F12/12.2	E	fresh	28	U	0	45	A	2	7.58				
Cuxton	1F12/12.3	EF	fresh	21	F	0	5	M	2	4.03				
Cuxton	1F12/12.4	E	almost fresh	21	P	0	40	A	2	13.13				
Cuxton	1F12/12.5	JK	almost fresh	28	F	0	0	N	1	3.61				
Cuxton	1F12/12.6	G	almost fresh	44	P	0	15	A	0	6.31				x
Cuxton	1F12/12.7	D	almost fresh	23	P	0	40	A	0	11.94				x
Cuxton	1F12/12.8	E	fresh	13	P	0	30	A	2	6.59				
Cuxton	1F12/12.9	DF	fresh	23	P	0	15	A	0	9.87				x
Cuxton	1F12/13.1	E	fresh	18	U	0	25	B	0	6.51			x	
Cuxton	1F12/13.2	FM	almost fresh	33	F	0	0	N	1	7.33		x		
Cuxton	1F12/13.3	DF	almost fresh	16	U	0	55	B	0	4.52				x
Cuxton	1F12/13.4	E	fresh	23	U	0	70	A	0	10.74				x
Cuxton	1F12/13.5	G	almost fresh	47	P	0	35	A	0	2.99				x
Cuxton	1F12/13.6	E	almost fresh	30	P	0	25	B	2	5.16				
Cuxton	1F12/13.7	J	fresh	23	U	0	0	N	1	4.35				
Cuxton	1F12/13.8	E	fresh	27	P	0	40	A	1	6.24				
Cuxton	1F12/13.9	J	almost fresh	24	F	0	0	N	1	4.47				
Cuxton	1F12/14.1	DF	almost fresh	63	P	0	15	B	2	7.82	x			
Cuxton	1F12/14.2	E	not fresh	35	P	0	30	A	1	4.5				
Cuxton	1F12/14.3	FG	not fresh	42	F	0	0	N	2	2.56				
Cuxton	1F12/14.4	F	fresh	20	F	0	0	N	1	6.31				
Cuxton	1F12/2.1	F	fresh	46	P	0	30	B	2	4.67				x
Cuxton	1F12/2.2	F	fresh	60	P	0	50	A	0	3.51				x

Cuxton	1F12/2.3	DF	almost fresh	22	P	0	35	A	0	8.29						
Cuxton	1F12/2.4	GH	fresh	36	U	1	20	B	0	3.99						
Cuxton	1F12/23.1	F	almost fresh	28	U	0	40	B	0	8.58			x			x
Cuxton	1F12/23.2	E	almost fresh	18	P	0	15	B	2	4.95		x				
Cuxton	1F12/23.3	M	almost fresh	39	P	0	10	M	2	10.03		x				x
Cuxton	1F12/23.4	F	almost fresh	23	U	0	45	B	2	12.29						x
Cuxton	1F12/23.5	M	almost fresh	36	P	0	5	B	2	5.82		x				x
Cuxton	1F12/23.6	F	almost fresh	20	U	0	40	B	2	4.79						x
Cuxton	1F12/23.7	FM	almost fresh	65	P	0	20	B	2	2.96		x				x
Cuxton	1F12/24.2	F	almost fresh	43	F	0	5	M	2	4.25						
Cuxton	1F12/24.3	EF	almost fresh	17	U	0	55	A	0	4.72				x		
Cuxton	1F12/24.4	FM	almost fresh	73	P	0	10	B	2	5.22			x			
Cuxton	1F12/24.5	M	almost fresh	62	F	0	0	N	2	3.15		x				
Cuxton	1F12/25.1	K	almost fresh	41	F	0	10	M	2	5.02						
Cuxton	1F12/25.2	E	fresh	14	U	0	70	A	0	2.77						
Cuxton	1F12/25.3	JK	fresh	37	F	0	0	N	2	7.2						
Cuxton	1F12/25.4	H	fresh	62	F	1	0	N	2	7.68					x	
Cuxton	1F12/25.5	DK	fresh	23	U	0	35	B	0	7.36				x		
Cuxton	1F12/25.6	E	almost fresh	13	U	0	30	B	0	6.87						
Cuxton	1F12/25.7	D	almost fresh	23	P	0	40	A	2	6.03						
Cuxton	1F12/25.8	F	fresh	62	F	0	5	M	2	9.53				x		
Cuxton	1F12/26.1	DF	fresh	10	U	0	55	A	0	5.19				x		
Cuxton	1F12/26.2	DK	fresh	42	P	0	40	A	2	5.41	x					

Cuxton	1F12/26.3	G	not fresh	74	F	0	0	N	2	7.92							
Cuxton	1F12/26.4	H	almost fresh	38	F	1	0	N	2	4.42							
Cuxton	1F12/26.5	F	almost fresh	51	F	0	0	N	2	2.25							
Cuxton	1F12/3.1	M	almost fresh	61	F	0	5	B	2	4.25			x				
Cuxton	1F12/3.2	M	almost fresh	58	P	0	15	A	2	3.36			x				
Cuxton	1F12/3.3	E	fresh	32	F	0	0	N	2	9.47							
Cuxton	1F12/3.4	GH	fresh	49	P	0	25	A	0	3.57							
Cuxton	1F12/4.1	H	fresh	36	P	0	25	A	0	6.43							
Cuxton	1F12/4.2	EF	fresh	21	P	0	25	A	1	4.2				x			
Cuxton	1F12/4.3	E	fresh	28	U	0	20	B	0	3.53							
Cuxton	1F12/4.4	H	fresh	20	U	1	30	B	0	9.02							x
Cuxton	1F12/4.5	FG	fresh	61	F	0	0	N	2	2.94						x	
Cuxton	1F12/4.6	H	fresh	30	U	1	0	N	2	8.56							
Cuxton	1F12/4.7	F	almost fresh	33	P	0	10	B	2	6.37							
Cuxton	1F12/4.8	DK	almost fresh	22	P	0	30	A	2	3.88					x		
Cuxton	1F12/5.1	E	almost fresh	31	F	0	25	M	2	8.63							
Cuxton	1F12/5.2	DK	fresh	40	P	0	25	A	0	8.42					x		
Cuxton	1F12/5.3	E	almost fresh	15	U	0	50	A	2	5.03					x		
Cuxton	1F12/5.4	E	almost fresh	26	F	0	10	M	0	5.02							
Cuxton	1F12/6.1	E	fresh	14	U	0	55	A	2	24.8	x				x		
Cuxton	1F12/6.2	GK	not fresh	34	F	0	35	M	2	4.28							
Cuxton	1F12/6.3	FG	almost fresh	35	P	0	10	B	2	2.7							
Cuxton	1F12/6.4	DF	almost fresh	37	U	0	25	B	2	9.62		x					
Cuxton	1F12/6.5	F	almost fresh	40	F	0	10	M	0	5.82	x				x		
Cuxton	1F12/6.6	H	fresh	64	P	0	40	B	0	5.17							
Cuxton	1F12/6.7	D	fresh	11	U	0	60	A	0	7.9					x		

Cuxton	1F12/7.2	G	not fresh	37	U	0	30	A	0	6.33								
Cuxton	1F12/7.3	E	almost fresh	23	P	0	20	B	2	4.59						x		
Cuxton	1F12/7.4	DK	fresh	29	F	0	5	B	1	3.94								
Cuxton	1F12/7.5	FM	almost fresh	38	F	0	10	M	0	4.9				x				
Cuxton	1F12/7.7	GJ	fresh	46	F	0	20	M	2	6.17							x	
Cuxton	1F12/7.8	F	fresh	27	P	0	20	B	2	6.11								
Cuxton	1F12/7.9	E	almost fresh	14	U	0	55	A	0	4.94								
Cuxton	1F12/8.1	F	almost fresh	57	F	0	5	M	2	4.12								x
Cuxton	1F12/8.2	F	almost fresh	40	F	0	15	M	2	5.97								x
Cuxton	1F12/8.3	F	almost fresh	48	F	0	0	N	2	2.06								x
Cuxton	1F12/8.6	FG	almost fresh	38	F	0	0	N	2	4.87								x
Cuxton	1F12/9.1	D	almost fresh	28	U	0	55	B	0	6.33				x				
Cuxton	1F12/9.2	M	fresh	51	U	0	25	B	0	4.05		x	x					
Cuxton	1F12/9.3	DF	not fresh	38	P	0	10	B	2	11.64	x							
Cuxton	1F12/9.4	GH	fresh	37	P	0	5	A	0	8.77					x			
Cuxton	1F12/9.5	E	fresh	22	U	0	60	A	0	4.12					x			
Cuxton	1F12/9.6	E	fresh	26	P	0	25	B	2	4.57								
Cuxton	1F13/1.1	GK	almost fresh	35	F	0	0	N	2	3.65							x	
Cuxton	1F13/1.2	F	almost fresh	81	F	0	0	N	2	2.97								
Cuxton	1F13/1.3	DF	fresh	13	P	0	65	A	0	5.31					x			
Cuxton	1F13/1.4	H	almost fresh	31	F	0	5	M	2	10.43							x	
Cuxton	1F13/2.1	FG	fresh	55	P	0	10	B	2	3.1								
Cuxton	1F13/2.2	FG	fresh	76	F	0	0	N	2	6.87								
Cuxton	1F13/2.3	GJ	fresh	61	F	0	5	B	2	2.81		x						
Cuxton	1F13/25.1	F	not fresh	44	P	0	5	B	2	6.9								x
Cuxton	1F13/25.2	D	not fresh	50	F	0	10	M	2	7.07								x

Cuxton	1F13/25.3	M	not fresh	55	P	0	5	B	2	6.63		x			x
Cuxton	1F13/25.4	H	almost fresh	38	P	0	5	B	2	3.38					
Cuxton	1F13/26.1	F	almost fresh	53	P	0	5	B	2	3.89				x	x
Cuxton	1F13/26.2	FM	almost fresh	59	P	0	20	B	0	8.51		x			x
Cuxton	1F13/26.3	H	almost fresh	37	P	0	10	B	2	2.66					
Cuxton	1F13/3.1	FM	fresh	64	F	0	0	N	2	1.98	x	x			
Cuxton	1F13/3.2	M	almost fresh	69	F	0	0	N	2	5.19		x			
Cuxton	1F14/2.1	F	almost fresh	75	F	0	0	N	2	6.19				x	x
Cuxton	1F14/2.2	FM	almost fresh	47	F	0	0	N	2	7.8			x	x	x
Cuxton	1F14/2.3	F	almost fresh	27	F	0	15	M	0	6.9					x

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Dunbridge	Dunbridge	AA		1910.102	148	92	88	37	510.1	51	74	77	19	28	0.40	0.62	0.34	p	0.96	0.13
Dunbridge	Dunbridge	AA		1910.103	140	79	65	46	427.3	37	36	77	15	46	0.58	0.56	0.26	p	0.47	0.11
Dunbridge	Dunbridge	AA		1910.104	143	85	68	43	433.8	41	41	73	14	41	0.51	0.59	0.29	p	0.56	0.10
Dunbridge	Dunbridge	AA		1910.105	142	83	78	41	489.5	52	65	75	20	43	0.49	0.58	0.37	o	0.87	0.14
Dunbridge	Dunbridge	AA		1910.106	118	85	78	35	316.8	42	43	76	13	28	0.41	0.72	0.36	o	0.57	0.11
Dunbridge	Dunbridge	AA		1910.107	130	70	60	36	294.2	33	31	62	11	25	0.51	0.54	0.25	p	0.50	0.08
Dunbridge	Dunbridge	AA		1910.108	168	83	55	58	429.3	36	33	81	14	50	0.70	0.49	0.21	p	0.41	0.08
Dunbridge	Dunbridge	AA		1910.109	116	74	63	41	277.8	25	32	64	11	40	0.55	0.64	0.22	p	0.50	0.09
Dunbridge	Dunbridge	AA		1910.11	124	79	64	56	402.7	32	30	77	11	40	0.71	0.64	0.26	p	0.39	0.09
Dunbridge	Dunbridge	AA		1910.111	153	61	53	33	305.8	58	33	53	13	30	0.54	0.40	0.38	o	0.62	0.08
Dunbridge	Dunbridge	AA		1910.112	144	90	80	47	438.7	51	49	85	15	28	0.52	0.63	0.35	o	0.58	0.10
Dunbridge	Dunbridge	AA		1910.113	117	56	49	32	164.8	38	21	53	10	28	0.57	0.48	0.32	p	0.40	0.09
Dunbridge	Dunbridge	AA		1910.114	115	64	57	43	224.5	28	22	63	13	41	0.67	0.56	0.24	p	0.35	0.11
Dunbridge	Dunbridge	AA		1910.115	120	54	45	37	214.9	9	29	53	13	20	0.69	0.45	0.08	p	0.55	0.11
Dunbridge	Dunbridge	AA		1910.117	109	65	61	41	239.7	26	36	58	13	32	0.63	0.60	0.24	p	0.62	0.12
Dunbridge	Dunbridge	AA		1910.118	127	70	63	38	266.6	34	39	62	13	27	0.54	0.55	0.27	p	0.63	0.10
Dunbridge	Dunbridge	AA		1910.119	111	76	57	39	251.1	24	31	75	13	37	0.51	0.68	0.22	p	0.41	0.12
Dunbridge	Dunbridge	AA		1910.12	149	90	90	51	730.6	78	74	77	25	50	0.57	0.60	0.52	o	0.96	0.17
Dunbridge	Dunbridge	AA		1910.121	107	72	60	46	307.5	18	29	72	18	37	0.64	0.67	0.17	p	0.40	0.17
Dunbridge	Dunbridge	AA		1910.122	117	88	69	33	297.6	26	40	85	12	31	0.38	0.75	0.22	p	0.47	0.10
Dunbridge	Dunbridge	AA		1910.123	107	44	37	27	99.7	21	18	44	7	24	0.61	0.41	0.20	p	0.41	0.07
Dunbridge	Dunbridge	AA		1910.124	167	84	83	46	673.3	74	60	72	24	50	0.55	0.50	0.44	o	0.83	0.14
Dunbridge	Dunbridge	AA		1910.126	195	91	76	45	682.5	59	49	80	13	45	0.49	0.47	0.30	p	0.61	0.07
Dunbridge	Dunbridge	AA		1910.127	144	89	67	36	339.1	40	33	86	12	29	0.40	0.62	0.28	p	0.38	0.08
Dunbridge	Dunbridge	AA		1910.128	70	50	47	26	75.8	27	31	39	11	20	0.52	0.71	0.39	o	0.79	0.16
Dunbridge	Dunbridge	AA		1910.131	95	61	58	28	156.8	36	35	50	16	22	0.46	0.64	0.38	o	0.70	0.17
Dunbridge	Dunbridge	AA		1910.132	75	61	56	29	129.4	21	41	57	20	21	0.48	0.81	0.28	p	0.72	0.27

Dunbridge	Dunbridge	AA		1910.133	104	61	60	30	196.5	40	42	48	16	27	0.49	0.59	0.38	o	0.88	0.15
Dunbridge	Dunbridge	AA		1910.136	70	58	56	22	83.2	26	34	52	11	20	0.38	0.83	0.37	o	0.65	0.16
Dunbridge	Dunbridge	AA		1911.31	117	89	87	32	305.7	40	52	66	14	25	0.36	0.76	0.34	p	0.79	0.12
Dunbridge	Dunbridge	AA		1911.32	115	83	74	30	283.7	39	46	73	15	25	0.36	0.72	0.34	p	0.63	0.13
Dunbridge	Dunbridge	AA		1911.34	139	95	87	39	563.8	45	46	89	22	35	0.41	0.68	0.32	p	0.52	0.16
Dunbridge	Dunbridge	AA		1911.35	97	67	61	29	168.8	29	31	62	12	20	0.43	0.69	0.30	p	0.50	0.12
Dunbridge	Dunbridge	AA		1911.36	95	72	57	29	168.3	23	29	66	15	23	0.40	0.76	0.24	p	0.44	0.16
Dunbridge	Dunbridge	AA		1911.37	126	70	65	40	306.6	34	35	63	13	35	0.57	0.56	0.27	p	0.56	0.10
Dunbridge	Dunbridge	AA		1911.38	91	66	59	32	187.5	29	32	59	18	27	0.48	0.73	0.32	p	0.54	0.20
Dunbridge	Dunbridge	AA		1911.39	86	52	42	29	119.8	18	21	51	13	30	0.56	0.60	0.21	p	0.41	0.15
Dunbridge	Dunbridge	AA		1911.4	70	35	28	10	29.6	24	13	34	8	9	0.29	0.50	0.34	p	0.38	0.11
Dunbridge	Dunbridge	AA		1911.41	97	66	59	25	159.9	28	32	64	13	23	0.38	0.68	0.29	p	0.50	0.13
Dunbridge	Dunbridge	AA		1911.42	144	92	89	41	499.5	56	62	77	17	38	0.45	0.64	0.39	o	0.81	0.12
Dunbridge	Dunbridge	AA		1911.43	135	81	75	36	393.5	37	62	70	21	26	0.44	0.60	0.27	p	0.89	0.16
Dunbridge	Dunbridge	AA		1911.44	185	82	80	63	850.4	99	73	63	25	44	0.77	0.44	0.54	o	1.16	0.14
Dunbridge	Dunbridge	AA		1911.45	108	55	53	40	211.1	40	33	53	10	38	0.73	0.51	0.37	o	0.62	0.09
Dunbridge	Dunbridge	AA		1911.46	74	42	41	25	76.1	31	27	36	10	18	0.60	0.57	0.42	o	0.75	0.14
Dunbridge	Dunbridge	AA		1911.47	85	59	57	23	129.8	39	41	51	15	17	0.39	0.69	0.46	o	0.80	0.18
Dunbridge	Dunbridge	AA		1911.48	115	85	83	36	390.3	35	66	78	26	33	0.42	0.74	0.30	p	0.85	0.23
Dunbridge	Dunbridge	AA		1911.49	80	74	72	34	234.9	22	53	72	22	23	0.46	0.93	0.28	p	0.74	0.28
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.09Z	102	68	67	36	265.5	57	53	57	18	27	0.53	0.67	0.56	c	0.93	0.18
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90A	126	85	83	31	397	55	67	79	17	30	0.36	0.67	0.44	o	0.85	0.13
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90B	145	101	91	53	748.4	46	66	94	33	44	0.52	0.70	0.32	p	0.70	0.23
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90C	114	90	85	44	488.3	34	67	75	33	38	0.49	0.79	0.30	p	0.89	0.29
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90D	106	91	86	47	474	37	68	79	32	40	0.52	0.86	0.35	p	0.86	0.30
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90E	100	76	76	37	295.1	50	48	58	20	34	0.49	0.76	0.50	o	0.83	0.20
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90F	108	75	70	33	293.3	34	45	68	15	25	0.44	0.69	0.31	p	0.66	0.14
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90G	135	85	72	32	373.8	20	35	83	17	31	0.38	0.63	0.15	p	0.42	0.13

Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90H	92	72	58	45	238.7	16	33	71	11	43	0.63	0.78	0.17	p	0.46	0.12
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90I	90	56	55	33	177.7	30	26	53	17	27	0.59	0.62	0.33	p	0.49	0.19
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90J	79	63	53	24	135.3	20	33	59	14	22	0.38	0.80	0.25	p	0.56	0.18
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90K	136	87	83	38	418.4	44	60	44	21	30	0.44	0.64	0.32	p	1.36	0.15
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90L	130	78	77	44	401.2	43	55	65	12	38	0.56	0.60	0.33	p	0.85	0.09
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90M	119	69	59	33	233.6	43	35	54	14	27	0.48	0.58	0.36	o	0.65	0.12
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90O	121	79	74	33	322.7	38	52	65	20	24	0.42	0.65	0.31	p	0.80	0.17
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90S	72	66	63	30	165.2	23	48	62	27	26	0.45	0.92	0.32	p	0.77	0.38
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90T	93	75	75	35	247.4	46	48	66	20	24	0.47	0.81	0.49	o	0.73	0.22
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90U	126	76	76	43	409.5	81	68	66	22	39	0.57	0.60	0.64	c	1.03	0.17
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90V	84	52	50	30	117.2	46	39	43	19	11	0.58	0.62	0.55	o	0.91	0.23
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90W	72	55	55	29	126.9	31	43	49	19	19	0.53	0.76	0.43	o	0.88	0.26
Dunbridge	Dunbridge	AA	E.A. Rawlance	1909.90X	71	57	56	26	120	25	34	50	20	18	0.46	0.80	0.35	o	0.68	0.28
Dunbridge	Dunbridge	AA		1917.125.8	84	84	77	28	190.5	38	64	61	16	19	0.33	1.00	0.45	o	1.05	0.19
Dunbridge	Dunbridge	ROM		AD305	154	76	69	36	348.8	38	41	73	15	32	0.47	0.49	0.25	p	0.56	0.10
Dunbridge	Dunbridge	ROM		AD717	130	90	82	35	517.3	53	53	77	19	34	0.39	0.69	0.41	o	0.69	0.15
Dunbridge	Dunbridge	AA		Z.15143.1	151	78	76	30	437.1	69	48	66	24	29	0.38	0.52	0.46	o	0.73	0.16
Dunbridge	Dunbridge	AA		Z.15143.2	184	84	71	54	704.6	54	48	76	19	58	0.64	0.46	0.29	p	0.63	0.10
Dunbridge	Dunbridge	AA		Z.15143.3	123	64	60	33	244.2	42	39	55	13	27	0.52	0.52	0.34	p	0.71	0.11
Dunbridge	Dunbridge	AA		Z.15143.4	192	74	65	51	602.2	45	47	70	14	53	0.69	0.39	0.23	p	0.67	0.07
Dunbridge	Dunbridge	AA		Z29426.1	85	65	65	30	186.7	38	52	52	18	23	0.46	0.76	0.45	o	1.00	0.21
Dunbridge	Dunbridge	AA		Z29426.10	91	74	69	26	175.2	24	44	62	17	23	0.35	0.81	0.26	p	0.71	0.19
Dunbridge	Dunbridge	AA		Z29426.11	88	71	64	26	173.8	26	42	60	21	18	0.37	0.81	0.30	p	0.70	0.24
Dunbridge	Dunbridge	AA		Z29426.12	85	58	56	34	162.9	31	35	51	17	30	0.59	0.68	0.36	o	0.69	0.20
Dunbridge	Dunbridge	AA		Z29426.13	100	76	74	29	254.6	38	59	70	18	26	0.38	0.76	0.38	o	0.84	0.18

Dunbridge	Dunbridge	AA		Z29426.14	110	65	64	35	247.3	36	33	57	18	27	0.54	0.59	0.33	p	0.58	0.16
Dunbridge	Dunbridge	AA		Z29426.15	103	86	76	36	326.2	34	42	76	20	34	0.42	0.83	0.33	p	0.55	0.19
Dunbridge	Dunbridge	AA		Z29426.16	88	61	59	26	160.3	37	48	51	18	23	0.43	0.69	0.42	o	0.94	0.20
Dunbridge	Dunbridge	AA		Z29426.17	99	76	64	47	238	25	35	74	19	44	0.62	0.77	0.25	p	0.47	0.19
Dunbridge	Dunbridge	AA		Z29426.18	118	82	78	26	316.8	40	51	70	19	25	0.32	0.69	0.34	p	0.73	0.16
Dunbridge	Dunbridge	AA		Z29426.19	146	71	66	46	457.8	35	52	68	19	44	0.65	0.49	0.24	p	0.76	0.13
Dunbridge	Dunbridge	AA		Z29426.2	111	67	62	34	259.2	33	44	54	17	26	0.51	0.60	0.30	p	0.81	0.15
Dunbridge	Dunbridge	AA		Z29426.20	82	79	72	31	222.7	21	45	74	19	28	0.39	0.96	0.26	p	0.61	0.23
Dunbridge	Dunbridge	AA		Z29426.21	90	59	49	42	166.2	18	30	59	12	38	0.71	0.66	0.20	p	0.51	0.13
Dunbridge	Dunbridge	AA		Z29426.22	84	62	59	28	144.7	24	31	48	17	22	0.45	0.74	0.29	p	0.65	0.20
Dunbridge	Dunbridge	AA		Z29426.3	87	66	60	25	170.2	26	41	59	14	22	0.38	0.76	0.30	p	0.69	0.16
Dunbridge	Dunbridge	AA		Z29426.4	106	70	61	29	219.6	32	35	60	16	27	0.41	0.66	0.30	p	0.58	0.15
Dunbridge	Dunbridge	AA		Z29426.5	79	60	59	26	121.2	24	42	53	16	15	0.43	0.76	0.30	p	0.79	0.20
Dunbridge	Dunbridge	AA		Z29426.6	105	78	71	31	290.5	30	47	74	20	30	0.40	0.74	0.29	p	0.64	0.19
Dunbridge	Dunbridge	AA		Z29426.7	101	85	84	39	346.3	48	62	70	25	26	0.46	0.84	0.48	o	0.89	0.25
Dunbridge	Dunbridge	AA		Z29426.8	75	63	59	39	177.6	14	44	57	17	31	0.62	0.84	0.19	p	0.77	0.23
Dunbridge	Dunbridge	AA		Z29426.9	81	65	59	26	142.2	21	35	63	13	22	0.40	0.80	0.26	p	0.56	0.16
Dunbridge	Dunbridge	AA		Z29428	127	76	75	46	444.2	68	63	67	16	44	0.61	0.60	0.54	o	0.94	0.13
Dunbridge	Dunbridge	AA		Z29429.2	77	51	51	32	132.9	35	36	45	18	24	0.63	0.66	0.45	o	0.80	0.23
Dunbridge	Dunbridge	AA		Z29430.1	98	60	59	25	148	44	42	42	18	19	0.42	0.61	0.45	o	1.00	0.18
Dunbridge	Dunbridge	AA		Z29430.2	107	72	67	30	278.7	22	57	70	17	24	0.42	0.67	0.21	p	0.81	0.16
Dunbridge	Dunbridge	AA		Z29431.1	95	64	59	42	188.6	36	43	58	12	37	0.66	0.67	0.38	o	0.74	0.13
Dunbridge	Dunbridge	AA		Z29431.2	155	91	88	55	588.1	61	56	79	14	52	0.60	0.59	0.39	o	0.71	0.09

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Dunbridge	1910.102	H	slightly rolled	48	f	0	10	m	2	4.12									
Dunbridge	1910.103		very rolled	38	p	0	15	a	0										
Dunbridge	1910.104		rolled	34	p	0	10	b	0										
Dunbridge	1910.105	H	slightly rolled	44	f	1	5	m	2	3.91									
Dunbridge	1910.106	J	very rolled	53	p	0	5	b	2	2.39									
Dunbridge	1910.107	F	slightly rolled	41	p	0	15	b	0	5.19				x		x			
Dunbridge	1910.108	FM	slightly rolled	53	p	1	5	b	2	5.45			x					x	
Dunbridge	1910.109	F	slightly rolled	39	p	0	20	a	0	4.75									
Dunbridge	1910.11	DF	rolled	26	p	0	30	b	0	6.13		x							
Dunbridge	1910.111	DF	rolled	28	u	0	60	b	0	6.15						x			
Dunbridge	1910.112	G	slightly rolled	33	f	1	15	m	2	5.92				x					
Dunbridge	1910.113	F	very fresh	41	p	0	5	b	1	2.36				x					
Dunbridge	1910.114	M	very rolled	32	f	0	0	n	2	2.89			x						
Dunbridge	1910.115	F	slightly rolled	40	p	0	10	b	2	6.57									
Dunbridge	1910.117	G	slightly rolled	15	u	0	70	b	0	5.28		x							
Dunbridge	1910.118	GJ	slightly rolled	54	f	0	0	n	2	2.64									
Dunbridge	1910.119	F	very fresh	49	f	0	0	n	2	3.25									
Dunbridge	1910.12	H	rolled	32	u	1	20	a	0	5.24		x							
Dunbridge	1910.121	DF	very rolled	41	p	0	15	b	2	5.39	x								
Dunbridge	1910.122	F	very rolled	49	p	0	5	b	2	3.16									

Dunbridge	1910.123	F	rolled	36	f	0	0	n	2	4.48								
Dunbridge	1910.124	GK	very rolled	54	f	0	0	n	2	2.89								
Dunbridge	1910.126	F	slightly rolled	59	f	0	20	m	0	3.23						x		
Dunbridge	1910.127	F	very fresh	58	f	0	0	n	2	3.28				x				
Dunbridge	1910.128	E	rolled	21	p	0	30	a	0	3.9								
Dunbridge	1910.131	J	rolled	47	f	0	0	n	1	2.64					x			
Dunbridge	1910.132	E	very rolled	24	f	0	0	n	2	5.49								x
Dunbridge	1910.133	K	very rolled	43	f	0	15	m	0	4.85							x	
Dunbridge	1910.136	JK	slightly rolled	41	f	0	0	n	1	4.08					x			
Dunbridge	1911.31	J	very rolled	51	f	0	10	m	2	3.51								
Dunbridge	1911.32	J	very rolled	39	p	1	10	a	0	2.85								
Dunbridge	1911.34	FG	very rolled	48	f	0	0	n	2	4.22					x			
Dunbridge	1911.35	J	very rolled	46	f	0	0	n	2	1.8								
Dunbridge	1911.36	EF	very rolled	39	f	0	5	m	2	2.94				x				
Dunbridge	1911.37	J	slightly rolled	39	p	1	20	b	0	3.71	x						x	
Dunbridge	1911.38		very rolled	33	p	0	5	b	2									
Dunbridge	1911.39	EF	very rolled	28	u	0	20	b	0	6.83				x				
Dunbridge	1911.4		rolled	23	f	0	5	m	1									
Dunbridge	1911.41	E	rolled	57	f	0	15	m	0	2.6			x					
Dunbridge	1911.42	GJ	very fresh	48	p	0	10	b	0	4.32		x						
Dunbridge	1911.43	HK	very fresh	33	p	1	20	a	0	4.18								
Dunbridge	1911.44	D	slightly rolled	59	p	0	25	a	0	5.38						x		
Dunbridge	1911.45		very fresh	26	p	0	5	b	0									
Dunbridge	1911.46		slightly rolled	20	p	0	25	a	0									

Dunbridge	1911.47	K	very rolled	39	f	0	0	n	2	5.16					
Dunbridge	1911.48		very rolled	41	f	0	5	m	2						
Dunbridge	1911.49		very rolled	32	f	0	10	m	0						
Dunbridge	1909.09Z	DK	very rolled	38	f	0	0	n	2	2.04					
Dunbridge	1909.90A	H	very rolled	46	f	0	5	m	2	3.73					
Dunbridge	1909.90B	FG	very rolled	58	f	0	10	m	0						
Dunbridge	1909.90C	D	very rolled	39	f	0	10	m	2	4.8					x
Dunbridge	1909.90D	K	very rolled	29	p	0	10	b	2	3.7					
Dunbridge	1909.90E	E	very rolled	27	p	0	15	b	0	5.51					
Dunbridge	1909.90F	JK	rolled	47	f	1	0	n	2	3.1					
Dunbridge	1909.90G	DF	very rolled	35	p	0	15	a	2	10.76	x				
Dunbridge	1909.90H	E	rolled	36	p	0	5	b	2	4.35		x	x		
Dunbridge	1909.90I	E	very rolled	41	p	0	5	b	2	8.36					
Dunbridge	1909.90J	E	very rolled	26	p	0	5	b	2	5.04					
Dunbridge	1909.90K	G	very rolled	37	p	0	20	a	0	11.66					x
Dunbridge	1909.90L	H	slightly rolled	37	f	1	0	n	2	2.21					
Dunbridge	1909.90M	FG	very rolled	31	f	0	0	n	2	7.71		x		x	x
Dunbridge	1909.90O	JK	very rolled	36	f	0	25	m	2	4.62					
Dunbridge	1909.90S	J	very rolled	29	f	0	5	m	0	3.64					
Dunbridge	1909.90T	K	very rolled	43	f	0	0	n	2	4.08					
Dunbridge	1909.90U	H	slightly rolled	40	p	1	15	a	0	4.47					
Dunbridge	1909.90V	K	very rolled	33	p	0	25	a	0	2.92					
Dunbridge	1909.90W	K	very rolled	26	u	0	45	a	0	4.57			x		

Dunbridge	1909.90X	J	very rolled	30	f	0	0	n	1	2.5					x		x
Dunbridge	1917.125.8	K	very rolled	30	f	0	0	n	2	4.14					x		
Dunbridge	AD305	FG	rolled	45	f	0	0	n	2	1.7		x					
Dunbridge	AD717	D	rolled	29	p	0	35	b	0	5.56							
Dunbridge	Z.15143.1	FG	rolled	61	u	0	35	b	0	3.55	x					x	
Dunbridge	Z.15143.2	F	rolled	67	p	0	5	b	0	2.31		x					
Dunbridge	Z.15143.3	FG	slightly rolled	50	p	0	20	a	0	3.58		x					
Dunbridge	Z.15143.4	F	slightly rolled	67	p	0	5	b	2	2.72							
Dunbridge	Z29426.1	K	very rolled	36	f	0	0	n	2	5.48							
Dunbridge	Z29426.10	JK	very rolled	35	p	1	5	b	0	4.76							
Dunbridge	Z29426.11	J	very rolled		f	0	0	n	2	4.76							
Dunbridge	Z29426.12	E	very rolled	22	u	0	25	b	2	6							
Dunbridge	Z29426.13	K	very rolled	44	f	0	5	m	2	3.37					x		
Dunbridge	Z29426.14	GJ	very rolled	39	f	0	0	n	2	4.67			x				
Dunbridge	Z29426.15	J	very rolled	31	u	0	20	b	0	3.83				x			
Dunbridge	Z29426.16		very rolled	28	f	0	20	m	0								
Dunbridge	Z29426.17		rolled	26	p	1	10	b	0								
Dunbridge	Z29426.18		very rolled	24	f	0	5	m	2								
Dunbridge	Z29426.19	GH	slightly rolled	47	f	0	10	m	2	3.61							
Dunbridge	Z29426.2	J	very rolled	44	f	0	5	m	0	3.2							
Dunbridge	Z29426.20	JK	very rolled	36	p	0	5	b	0	4.78							
Dunbridge	Z29426.21	EF	very rolled	17	p	0	10	b	2	12.89							
Dunbridge	Z29426.22	J	rolled	45	f	0	0	n	2	2.52							
Dunbridge	Z29426.3	J	very rolled	46	f	0	0	n	2	2.55							

Dunbridge	Z29426.4	E	very rolled	27	f	0	0	n	2	6.5				
Dunbridge	Z29426.5	K	very rolled	23	f	0	5	m	2	3.28				
Dunbridge	Z29426.6	J	very rolled	35	f	0	10	m	2	2.8				
Dunbridge	Z29426.7	JK	very rolled	40	f	0	0	n	2	3.02				
Dunbridge	Z29426.8	E	very rolled	22	p	0	5	b	2	4.91				x
Dunbridge	Z29426.9	E	very rolled	27	f	0	0	n	2	5.88				
Dunbridge	Z29428	H	rolled	34	p	1	15	b	0	7.62				
Dunbridge	Z29429.2	K	very rolled	32	f	0	10	m	2	4.69				
Dunbridge	Z29430.1	J	very rolled	24	f	0	0	n	2	7.7			x	
Dunbridge	Z29430.2	E	very rolled	23	f	0	5	m	0	8.77		x		
Dunbridge	Z29431.1	E	very fresh	27	f	0	5	m	1	4.15				
Dunbridge	Z29431.2	G	very fresh	22	u	0	40	a	1	7.02	x			

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Farnham	Culverlands Ter C.	BM		1654	143	109	102	47		49	60	92	21	33	0.43	0.76	0.34	p	0.65	0.64
Farnham	Culverlands Ter C.	BM		1655	85	54	46	30		21	31	52	13	26	0.56	0.64	0.25	p	0.60	0.50
Farnham	Farnham C	BM	Wade	1926.6.14.1	109	106	105	35		57	81	86	21	26	0.33	0.97	0.52	o	0.94	0.81
Farnham	Farnham C	BM	Wade	1926.6.14.2	154	115	113	37		83	92	93	18	33	0.32	0.75	0.54	o	0.99	0.55
Farnham	Farnham C	BM		1927.2.14.1	146	99	84	39		43	60	82	20	31	0.39	0.68	0.29	p	0.73	0.65
Farnham	Farnham C	BM	H. Bury	E 6857	137	74	73	43		60	46	66	17	39	0.58	0.54	0.44	o	0.70	0.44
Farnham	Farnham C	BM	Geological Museum	Econ 6852	91	59	55	40		22	31	58	9	35	0.68	0.65	0.24	p	0.53	0.26
Farnham	Farnham C	BM		Econ 6861	128	79	77	44		61	54	67	18	34	0.56	0.62	0.48	o	0.81	0.53
Farnham	Grammar School Pit	BM	IOA collection	p1989.1.4.1	136	73	62	35		26	41	68	17	33	0.48	0.54	0.19	p	0.60	0.52
Farnham	Grammar School Pit	BM	IOA collection	P1989.1.4.2	124	77	67	27		45	36	75	18	23	0.35	0.62	0.36	o	0.48	0.78
Farnham	Farnham C	BM	Wade	Wade col 1	136	83	77	41		38	49	72	21	26	0.49	0.61	0.28	p	0.68	0.81
Farnham	Farnham C	BM	Wade	Wade col 2	137	81	78	44		58	74	68	27	36	0.54	0.59	0.42	o	1.09	0.75
Farnham	Farnham C	BM	Wade	Wade col 2.1	91	55	53	21		27	39	52	10	16	0.38	0.60	0.30	p	0.75	0.63
Farnham	Farnham C	BM	Wade	Wade col 2.2	78	47	44	26		17	30	46	17	21	0.55	0.60	0.22	p	0.65	0.81
Farnham	Farnham C	BM	Wade	Wade col 2.3	58	53	51	23		17	34	50	17	16	0.43	0.91	0.29	p	0.68	1.06
Farnham	Farnham C	BM	Wade	Wade col 2.4	128	56	35	36		17	22	55	11	36	0.64	0.44	0.13	p	0.40	0.31
Farnham	Farnham C	BM	Wade	Wade col 2.5	74	59	57	33		29	34	48	16	32	0.56	0.80	0.39	o	0.71	0.50
Farnham	Farnham C	BM	Wade	Wade col 2.6	84	51	46	38		22	31	52	12	35	0.75	0.61	0.26	p	0.60	0.34
Farnham	Farnham C	BM	Wade	Wade col 2.7	91	64	48	28		10	28	63	11	28	0.44	0.70	0.11	p	0.44	0.39
Farnham	Farnham C	BM	Wade	Wade col 2.8	70	49	46	26		19	26	49	15	25	0.53	0.70	0.27	p	0.53	0.60
Farnham	Farnham C	BM	Wade	Wade col 3	115	74	72	44		49	63	62	20	35	0.59	0.64	0.43	o	1.02	0.57
Farnham	Stoneyfield	BM	Wade	Wade col 3.1	90	74	71	22		54	64	54	11	18	0.30	0.82	0.60	c	1.19	0.61

Farnham	Farnham C	BM	Wade	Wade col 4	113	84	74	28		45	46	73	17	22	0.33	0.74	0.40	o	0.63	0.77
Farnham	Farnham C	BM	Wade	Wade col 4.1	116	64	51	35		30	32	60	8	27	0.55	0.55	0.26	p	0.53	0.30
Farnham	Farnham C	BM	Wade	Wade col 5	123	90	88	50		64	76	67	19	40	0.56	0.73	0.52	o	1.13	0.48
Farnham	Farnham C	BM	Wade	Wade col 5.1	138	85	83	43		49	65	76	24	27	0.51	0.62	0.36	o	0.86	0.89
Farnham	Farnham C	BM	Wade	Wade col 5.2	117	50	40	46		38	28	43	23	42	0.92	0.43	0.32	p	0.65	0.55

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Farnham	1654	G	slightly rolled	51	f	0	5	m	2	8.47									x
Farnham	1655	EF	very fresh	27	u	0	10	b	2	9.59									
Farnham	1926.6.14.1	K	rolled	25	f	0	10	m	2	3.89									
Farnham	1926.6.14.2	HK	rolled	49	f	0	0	n	2	3.62									
Farnham	1927.2.14.1	G	slightly rolled	37	p	0	30	a	0	3.47									
Farnham	E 6857	FG	slightly rolled	34	p	0	10	a	0	4.79									
Farnham	Econ 6852	EF	very fresh	23	p	0	20	a	0	2.78									
Farnham	Econ 6861	GK	slightly rolled	50	p	0	15	a	0	3.54						x			
Farnham	p1989.1.4.1	F	rolled	38	p	0	15	a	2	6.35		x							
Farnham	P1989.1.4.2	F	rolled	26	p	0	10	a	0	2.78									
Farnham	Wade col 1	FG	very rolled	42	f	0	0	n	2	2.74									
Farnham	Wade col 2	L	very rolled	42	f	0	25	m	2	6.11									
Farnham	Wade col 2.1	JK	very fresh	31	f	0	0	n	2	2.77									
Farnham	Wade col 2.2	E	rolled	18	p	0	85	a	0	9.83	x								
Farnham	Wade col 2.3	J	rolled	22	p	0	5	b	2	1.97									
Farnham	Wade col 2.4	M	slightly rolled	41	f	0	10	m	0	2.92			x						
Farnham	Wade col 2.5	E	very rolled	20	f	0	10	m	0	7.38									
Farnham	Wade col 2.6	E	very fresh	25	u	0	20	b	0	6.82									
Farnham	Wade col 2.7	EF	slightly rolled	21	f	0	25	m	2	3.14									
Farnham	Wade col 2.8	E	very rolled	18	f	0	30	m	2	5.13									
Farnham	Wade col 3	H	rolled	31	p	0	15	a	0	6.33									
Farnham	Wade col 3.1	H	rolled	26	f	0	0	n	2	4.84									

Farnham	Wade col 4	G	very rolled	37	f	0	0	n	2	6.14		
Farnham	Wade col 4.1	FM	very fresh	34	f	0	10	m	2	4.52	x	
Farnham	Wade col 5	H	slightly rolled	30	p	1	30	b	0	6.37		x
Farnham	Wade col 5.1	GH	slightly rolled	29	f	1	10	m	2	2.94		
Farnham	Wade col 5.2	D	rolled	27	p	0	15	a	1	5.84		

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A11/1.1	135	75	64	52	403	45	33	68	13	48	0.69	0.56	0.33	P	0.49	0.27
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A11/1.2	105	60	56	34	197	34	44	52	14	26	0.57	0.57	0.32	P	0.85	0.54
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A11/12.1	80	64	57	23	108	29	27	54	13	18	0.36	0.80	0.36	O	0.50	0.72
Furze Platt	Cannoncourt Farm Pit	BM	Ipswich	1A11/2.1	158	79	70	31	342	29	39	78	12	28	0.39	0.50	0.18	P	0.50	0.43
Furze Platt	Cannoncourt Farm Pit	BM	Ipswich	1A11/2.2	154	79	49	45	392	18	26	77	11	36	0.57	0.51	0.12	P	0.34	0.31
Furze Platt	Cannoncourt Farm Pit	BM	Ipswich	1A11/2.3	149	88	73	37	469	38	54	79	17	36	0.42	0.59	0.26	P	0.68	0.47
Furze Platt	Cannoncourt Farm Pit	BM	Ipswich	1A11/2.4	120	70	55	42	271	28	26	70	12	40	0.60	0.58	0.23	P	0.37	0.30
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A11/22.1	93	65	65	28	184	47	50	55	11	25	0.43	0.70	0.51	O	0.91	0.44
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A11/22.2	89	60	37	34	144	11	24	59	11	33	0.57	0.67	0.12	P	0.41	0.33
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A11/22.3	99	56	46	33	155	27	27	54	11	32	0.59	0.57	0.27	P	0.50	0.34
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A11/5.1	166	84	74	44	619	64	40	79	17	43	0.52	0.51	0.39	O	0.51	0.40
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A11/5.2	165	84	50	52	479	34	29	84	17	52	0.62	0.51	0.21	P	0.35	0.33
Furze Platt	Cannoncourt Farm Pit	BM	Lord Avebury	1A11/6.1	96	57	49	31	168	19	28	56	16	30	0.54	0.59	0.20	P	0.50	0.53
Furze Platt	Cannoncourt Farm Pit	BM	Lord Avebury	1A11/6.2	106	55	54	32	200	44	38	47	19	30	0.58	0.52	0.42	O	0.81	0.63
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A11/7.1	155	78	52	40	340	40	29	72	9	39	0.51	0.50	0.26	P	0.40	0.23
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A11/7.2	92	58	49	33	140	21	30	56	11	32	0.57	0.63	0.23	P	0.54	0.34
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/1.2	71	63	61	25	102	16	41	41	11	24	0.40	0.89	0.23	P	1.00	0.46
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/15.1	113	95	75	41	401	21	52	94	14	36	0.43	0.84	0.19	P	0.55	0.39
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/15.2	136	73	71	67	532	50	46	62	17	65	0.92	0.54	0.37	O	0.74	0.26
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/15.3	135	93	64	47	435	15	46	93	20	40	0.51	0.69	0.11	P	0.49	0.50

Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/16.1	85	56	54	26	138	24	37	55	14	25	0.46	0.66	0.28	P	0.67	0.56
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/16.2	104	79	75	35	313	43	51	65	19	31	0.44	0.76	0.41	O	0.78	0.61
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/16.3	105	69	65	38	251	34	35	69	13	35	0.55	0.66	0.32	P	0.51	0.37
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/16.4	100	52	44	26	131	25	31	49	16	25	0.50	0.52	0.25	P	0.63	0.64
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/16.5	80	57	57	38	164	43	34	49	12	32	0.67	0.71	0.54	O	0.69	0.38
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/16.6	97	58	45	38	159	22	30	55	12	38	0.66	0.60	0.23	P	0.55	0.32
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/17.1	136	82	59	46	418	33	37	80	17	43	0.56	0.60	0.24	P	0.46	0.40
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/17.2	168	101	95	56	858	64	66	84	18	46	0.55	0.60	0.38	O	0.79	0.39
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/18.1	117	78	71	41	319	51	41	64	16	34	0.53	0.67	0.44	O	0.64	0.47
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/18.2	126	76	74	36	365	21	46	75	14	28	0.47	0.60	0.17	P	0.61	0.50
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/18.3	141	68	62	48	384	44	36	66	17	43	0.71	0.48	0.31	P	0.55	0.40
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/18.4	116	72	70	37	347	40	51	65	20	37	0.51	0.62	0.34	P	0.78	0.54
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/18.5	85	65	64	29	160	38	46	53	16	24	0.45	0.76	0.45	O	0.87	0.67
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/19.1	97	72	65	43	288	34	32	67	21	30	0.60	0.74	0.35	O	0.48	0.70
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/19.2	75	43	31	27	73	21	21	41	12	27	0.63	0.57	0.28	P	0.51	0.44
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/19.3	109	67	56	30	218	39	40	63	12	26	0.45	0.61	0.36	O	0.63	0.46
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/19.4	119	62	44	44	274	22	30	61	15	33	0.71	0.52	0.18	P	0.49	0.45
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/19.5	79	50	44	33	115	23	29	48	14	28	0.66	0.63	0.29	P	0.60	0.50
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/19.6	110	69	63	34	271	33	43	64	14	29	0.49	0.63	0.30	P	0.67	0.48
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/2.1	68	70	63	28	144	4	40	70	16	28	0.40	1.03	0.06	P	0.57	0.57
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/20.1	93	78	77	33	222	49	51	70	13	19	0.42	0.84	0.53	O	0.73	0.68
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/20.2	111	55	47	30	166	26	28	54	11	28	0.55	0.50	0.23	P	0.52	0.39
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/20.3	100	45	40	41	165	40	23	41	20	26	0.91	0.45	0.40	O	0.56	0.77

Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/20.4	89	53	43	36	131	15	19	52	9	36	0.68	0.60	0.17	P	0.37	0.25
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/20.5	123	59	58	41	307	53	43	56	13	32	0.69	0.48	0.43	O	0.77	0.41
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/20.6	84	53	43	28	109	36	32	43	10	22	0.53	0.63	0.43	O	0.74	0.45
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/20.7	91	52	42	24	99	40	23	41	9	20	0.46	0.57	0.44	O	0.56	0.45
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/21.1	107	65	59	42	250	53	39	52	12	35	0.65	0.61	0.50	O	0.75	0.34
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/21.2	107	57	51	38	194	41	29	37	13	28	0.67	0.53	0.38	O	0.78	0.46
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/21.3	92	60	44	35	141	20	21	54	11	32	0.58	0.65	0.22	P	0.39	0.34
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/21.4	99	47	41	34	150	21	26	45	12	31	0.72	0.47	0.21	P	0.58	0.39
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/21.5	117	57	38	31	158	25	23	53	9	29	0.54	0.49	0.21	P	0.43	0.31
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/21.6	103	65	55	41	231	38	33	44	13	40	0.63	0.63	0.37	O	0.75	0.33
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/22.1	94	72	70	36	216	42	33	65	17	28	0.50	0.77	0.45	O	0.51	0.61
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/22.2	69	45	44	30	81	37	32	39	9	27	0.67	0.65	0.54	O	0.82	0.33
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/22.3	109	52	50	39		44	30	34	17	34	0.75	0.48	0.40	O	0.88	0.50
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/22.4	95	48	46	29		47	29	36	10	28	0.60	0.51	0.49	O	0.81	0.36
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/22.5	97	57	56	32		38	42	47	16	28	0.56	0.59	0.39	O	0.89	0.57
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A12/22.6	77	48	47	29		34	22	41	11	28	0.60	0.62	0.44	O	0.54	0.39
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/1.2	93	67	61	36	207	39	43	54	18	34	0.54	0.72	0.42	O	0.80	0.53
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/1.3	65	37	32	24	51	19	19	34	7	23	0.65	0.57	0.29	P	0.56	0.30
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/1.4	97	78	66	44	303	32	37	65	15	38	0.56	0.80	0.33	P	0.57	0.39
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/1.5	92	58	50	28	150	34	31	57	13	27	0.48	0.63	0.37	O	0.54	0.48
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/1.6	116	71	70	36	291	49	38	68	14	31	0.51	0.61	0.42	O	0.56	0.45
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/1.7	90	57	40	38	161	27	31	51	21	37	0.67	0.63	0.30	P	0.61	0.57
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/10.1	81	54	49	30	114	11	27	50	12	25	0.56	0.67	0.14	P	0.54	0.48

Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/10.2	114	65	46	40	272	37	35	63	13	29	0.62	0.57	0.32	P	0.56	0.45
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/10.3	108	52	44	34	185	41	29	43	14	28	0.65	0.48	0.38	O	0.67	0.50
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/10.4	116	69	59	35	238	33	37	53	12	30	0.51	0.59	0.28	P	0.70	0.40
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/10.5	141	83	64	28	337	29	39	82	13	32	0.34	0.59	0.21	P	0.48	0.41
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/11.1	110	70	37	43	267	27	17	62	12	43	0.61	0.64	0.25	P	0.27	0.28
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/11.2	113	74	55	50	283	16	26	72	18	46	0.68	0.65	0.14	P	0.36	0.39
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/11.3	137	59	39	30	197	31	27	57	12	29	0.51	0.43	0.23	P	0.47	0.41
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/11.4	163	90	87	46	803	40	70	89	18	45	0.51	0.55	0.25	P	0.79	0.40
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/11.5	151	68	45	28	230	33	27	64	13	27	0.41	0.45	0.22	P	0.42	0.48
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/11.6	116	50	31	30	123	24	18	49	9	31	0.60	0.43	0.21	P	0.37	0.29
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/12.1	132	78	70	51	433	54	52	62	16	44	0.65	0.59	0.41	O	0.84	0.36
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/12.2	94	65	59	27	132	38	33	50	17	26	0.42	0.69	0.40	O	0.66	0.65
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/12.3	79	61	56	41	172	31	35	53	13	39	0.67	0.77	0.39	O	0.66	0.33
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/12.4	135	87	82	49	591	72	59	63	20	32	0.56	0.64	0.53	O	0.94	0.63
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/13.1	108	66	53	45	263	24	27	66	19	44	0.68	0.61	0.22	P	0.41	0.43
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/13.2	93	55	52	32	181	62	41	49	14	24	0.58	0.59	0.67	C	0.84	0.58
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/13.3	133	75	72	43	433	45	33	68	11	43	0.57	0.56	0.34	P	0.49	0.26
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/13.4	164	84	84	53	750	78	63	69	18	37	0.63	0.51	0.48	O	0.91	0.49
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/14.1	127	68	62	43	354	52	46	67	13	42	0.63	0.54	0.41	O	0.69	0.31
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/14.2	155	86	75	44	565	47	52	74	20	40	0.51	0.55	0.30	P	0.70	0.50
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/14.3	141	77	75	48	419	41	58	73	14	41	0.62	0.55	0.29	P	0.79	0.34
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/15.1	131	80	65	49	429	38	40	77	23	48	0.61	0.61	0.29	P	0.52	0.48
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/15.2	132	70	58	35	232	27	33	69	14	18	0.50	0.53	0.20	P	0.48	0.78

Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/15.3	111	75	71	37	335	54	53	72	17	35	0.49	0.68	0.49	O	0.74	0.49
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/15.4	115	74	67	44	373	37	49	68	16	37	0.59	0.64	0.32	P	0.72	0.43
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/16.1	108	62	58	29	224	31	34	57	16	28	0.47	0.57	0.29	P	0.60	0.57
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/16.2	101	64	53	33	203	28	39	55	11	27	0.52	0.63	0.28	P	0.71	0.41
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/16.3	74	45	34	25	72	12	23	43	11	19	0.56	0.61	0.16	P	0.53	0.58
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/16.4	111	58	51	36	204	40	37	46	14	33	0.62	0.52	0.36	O	0.80	0.42
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/17.1	91	56	52	37	128	41	27	48	7	23	0.66	0.62	0.45	O	0.56	0.30
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/17.2	86	56	51	40	155	35	22	34	12	28	0.71	0.65	0.41	O	0.65	0.43
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/17.3	122	64	60	36	263	43	43	43	13	27	0.56	0.52	0.35	O	1.00	0.48
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/17.4	106	70	60	37	243	37	39	67	11	30	0.53	0.66	0.35	O	0.58	0.37
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/17.5	111	81	64	31	309	32	39	74	17	30	0.38	0.73	0.29	P	0.53	0.57
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/18.1	89	55	54	31	162	43	31	42	13	28	0.56	0.62	0.48	O	0.74	0.46
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/18.2	109	58	55	34	222	57	39	43	19	31	0.59	0.53	0.52	O	0.91	0.61
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/18.3	100	68	52	42	236	42	31	62	12	34	0.62	0.68	0.42	O	0.50	0.35
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/18.4	101	58	53	27	131	18	29	57	9	13	0.47	0.57	0.18	P	0.51	0.69
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/2.1	117	56	53	41	263	44	35	43	13	36	0.73	0.48	0.38	O	0.81	0.36
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/2.2	126	73	56	41	321	37	35	69	13	26	0.56	0.58	0.29	P	0.51	0.50
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/2.3	153	94	84	40	516	48	49	81	14	29	0.43	0.61	0.31	P	0.60	0.48
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/2.4	87	56	48	31	131	28	26	51	8	27	0.55	0.64	0.32	P	0.51	0.30
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/2.5	75	46	40	29	80	23	20	46	10	28	0.63	0.61	0.31	P	0.43	0.36
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/20.1	117	67	58	38	313	27	48	60	22	27	0.57	0.57	0.23	P	0.80	0.81
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/20.2	104	64	52	25	155	15	35	64	14	21	0.39	0.62	0.14	P	0.55	0.67
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/20.3	105	82	70	37	259	37	51	57	19	37	0.45	0.78	0.35	O	0.89	0.51

Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/21.1	119	70	67	41	302	57	55	61	14	39	0.59	0.59	0.48	O	0.90	0.36
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/21.2	123	92	90	48	576	56	71	61	23	44	0.52	0.75	0.46	O	1.16	0.52
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/21.3	139	79	75	49	609	38	59	67	26	44	0.62	0.57	0.27	P	0.88	0.59
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/21.4	105	91	83	47	539	19	61	90	21	46	0.52	0.87	0.18	P	0.68	0.46
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/22.1	144	112	111	47	825	68	101	98	17	41	0.42	0.78	0.47	O	1.03	0.41
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/22.2	138	80	73	59	669	42	53	73	16	35	0.74	0.58	0.30	P	0.73	0.46
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/22.3	128	80	78	46	503	31	60	75	19	37	0.58	0.63	0.24	P	0.80	0.51
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/3.1	125	62	55	41	250	47	28	54	11	38	0.66	0.50	0.38	O	0.52	0.29
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/3.2	107	41	36	43	162	17	30	40	12	43	1.05	0.38	0.16	P	0.75	0.28
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/3.3	147	95	92	49	564	70	49	82	11	35	0.52	0.65	0.48	O	0.60	0.31
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/3.4	160	82	74	43	479	57	50	55	17	37	0.52	0.51	0.36	O	0.91	0.46
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/4.1	187	117	81	58	876	38	47	115	18	52	0.50	0.63	0.20	P	0.41	0.35
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/4.2	200	100	91	39	747	43	62	90	19	37	0.39	0.50	0.22	P	0.69	0.51
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/5.1	169	91	67	55	649	30	35	90	17	51	0.60	0.54	0.18	P	0.39	0.33
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/5.2	142	66	53	52	334	34	31	63	13	37	0.79	0.46	0.24	P	0.49	0.35
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/5.3	133	74	51	52	342	34	30	69	15	45	0.70	0.56	0.26	P	0.43	0.33
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/6.1	128	80	66	44	383	37	34	77	19	41	0.55	0.63	0.29	P	0.44	0.46
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/6.2	177	85	81	44	658	47	50	73	20	44	0.52	0.48	0.27	P	0.68	0.45
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/7.1	110	74	68	42	245	56	35	62	14	39	0.57	0.67	0.51	O	0.56	0.36
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/7.2	112	66	59	37	293	39	38	57	10	28	0.56	0.59	0.35	O	0.67	0.36
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/7.3	124	55	35	36	177	41	22	54	11	34	0.65	0.44	0.33	P	0.41	0.32
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/7.4	188	93	55	43	550	43	31	89	14	44	0.46	0.49	0.23	P	0.35	0.32
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/8.1	122	68	66	36	301	61	39	55	14	39	0.53	0.56	0.50	O	0.71	0.36

Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/8.2	132	80	75	42	382	55	50	71	16	31	0.53	0.61	0.42	O	0.70	0.52
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/8.3	115	63	57	44	253	34	36	54	13	38	0.70	0.55	0.30	P	0.67	0.34
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/8.4	112	68	60	50	339	55	43	56	14	40	0.74	0.61	0.49	O	0.77	0.35
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/8.5	102	58	57	34	187	52	33	43	20	27	0.59	0.57	0.51	O	0.77	0.74
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/9.1	118	82	78	32	260	54	37	56	20	21	0.39	0.69	0.46	O	0.66	0.95
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/9.3	133	73	60	34	316	18	43	73	16	20	0.47	0.55	0.14	P	0.59	0.80
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A13/9.4	108	66	64	34	227	50	35	45	14	28	0.52	0.61	0.46	O	0.78	0.50
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/10.1	213	119	87	43	870	43	55	111	21	38	0.36	0.56	0.20	P	0.50	0.55
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/11.1	95	42	41	29	109	33	22	41	10	38	0.69	0.44	0.35	O	0.54	0.26
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/11.2	125	55	48	32		43	30	54	12	29	0.58	0.44	0.34	P	0.56	0.41
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/12.1	126	75	65	44	383	45	38	73	18	33	0.59	0.60	0.36	O	0.52	0.55
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/12.2	109	54	47	36	201	41	32	53	12	37	0.67	0.50	0.38	O	0.60	0.32
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/12.3	85	53	53	27	119	42	36	38	14	19	0.51	0.62	0.49	O	0.95	0.74
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/12.4	125	72	63	35	273	44	42	42	14	32	0.49	0.58	0.35	O	1.00	0.44
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/13.1	138	70	64	39	326	54	38	64	12	33	0.56	0.51	0.39	O	0.59	0.36
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/13.2	94	59	46	33	143	28	27	53	10	28	0.56	0.63	0.30	P	0.51	0.36
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/13.3	116	69	63	33	253	51	41	55	14	29	0.48	0.59	0.44	O	0.75	0.48
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/15.1	212	124	78	49	1062	51	45	124	19	49	0.40	0.58	0.24	P	0.36	0.39
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/15.2	118	76	69	45	422	47	47	67	20	27	0.59	0.64	0.40	O	0.70	0.74
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/3.1	136	77	74	47	519	61	63	61	20	45	0.61	0.57	0.45	O	1.03	0.44
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/3.2	134	87	86	45	495	75	55	69	15	39	0.52	0.65	0.56	C	0.80	0.38
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/3.3	152	101	100	50	797	70	79	81	14	42	0.50	0.66	0.46	O	0.98	0.33
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/4.1	173	97	93	43	823	37	71	90	16	32	0.44	0.56	0.21	P	0.79	0.50

Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/4.2	137	90	84	49	591	52	67	80	17	50	0.54	0.66	0.38	O	0.84	0.34
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/5.1	119	61	61	41	307	60	52	57	28	36	0.67	0.51	0.50	O	0.91	0.78
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/5.2	130	81	77	43	363	49	48	69	16	35	0.53	0.62	0.38	O	0.70	0.46
Furze Platt	Cannoncourt Farm Pit	BM	A.D. Lacaille	1A14/5.3	125	86	79	47	455	49	56	61	18	42	0.55	0.69	0.39	O	0.92	0.43
Furze Platt	Furze Platt	ROM	Treacher	930x85.32	148	86	81	33	481.8	47	68	76	15	29	0.38	0.58	0.32	p	0.89	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD1	111	61	46	34	228.2	31	27	59	13	26	0.56	0.55	0.28	p	0.46	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD103	112	62	32	26	128.5	24	19	60	9	23	0.42	0.55	0.21	p	0.32	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD1041	83	45	41	35	101.5	36	27	37	10	24	0.78	0.54	0.43	o	0.73	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD1042	139	81	81	31	389.9	66	59	56	11	27	0.38	0.58	0.47	o	1.05	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD1044	100	69	59	43	246.8	32	36	58	17	32	0.62	0.69	0.32	p	0.62	0.17
Furze Platt	Furze Platt	ROM	Treacher	AD1045	91	51	50	24	87.4	39	27	39	9	15	0.47	0.56	0.43	o	0.69	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD1046	127	75	66	38	349.5	44	46	70	15	30	0.51	0.59	0.35	p	0.66	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD106	86	51	44	39	144.5	29	24	46	14	35	0.76	0.59	0.34	p	0.52	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD108	103	56	44	37	169.4	25	29	55	12	34	0.66	0.54	0.24	p	0.53	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD1089	102	67	57	28	174.3	28	26	63	10	25	0.42	0.66	0.27	p	0.41	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD117	71	45	45	35	79.7	36	26	35	10	31	0.78	0.63	0.51	o	0.74	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD120	85	47	44	26	85.9	26	27	40	9	24	0.55	0.55	0.31	p	0.68	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD121	68	43	40	34	108.2	9	25	42	12	34	0.79	0.63	0.13	p	0.60	0.18
Furze Platt	Furze Platt	ROM	Treacher	AD122	77	46	40	22	75.5	26	24	42	14	16	0.48	0.60	0.34	p	0.57	0.18
Furze Platt	Furze Platt	ROM	Treacher	AD126	151	76	66	50	448.6	47	45	64	13	45	0.66	0.50	0.31	p	0.70	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD127	157	78	60	45	445.7	38	38	73	10	40	0.58	0.50	0.24	p	0.52	0.06
Furze Platt	Furze Platt	ROM	Treacher	AD128	137	75	65	42	377.2	29	42	73	14	31	0.56	0.55	0.21	p	0.58	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD130	134	76	66	46	403.2	41	47	75	19	35	0.61	0.57	0.31	p	0.63	0.14

Furze Platt	Furze Platt	ROM	Treacher	AD135	144	82	80	43	534.3	86	78	62	21	37	0.52	0.57	0.60	c	1.26	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD136	152	75	60	36	342.3	48	49	66	15	22	0.48	0.49	0.32	p	0.74	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD138	124	78	75	43	387.5	47	53	68	16	40	0.55	0.63	0.38	o	0.78	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD139	117	74	66	38	296	42	37	66	19	26	0.51	0.63	0.36	o	0.56	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD141	138	71	63	39	295.9	56	40	58	18	28	0.55	0.51	0.41	o	0.69	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD142	120	80	65	35	338.5	29	36	77	14	33	0.44	0.67	0.24	p	0.47	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD143	112	79	75	29	301.7	69	73	60	20	28	0.37	0.71	0.62	c	1.22	0.18
Furze Platt	Furze Platt	ROM	Treacher	AD144	146	87	75	52	494.6	30	44	87	18	36	0.60	0.60	0.21	p	0.51	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD145	104	61	49	31	166.2	15	30	58	9	25	0.51	0.59	0.14	p	0.52	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD146	127	65	57	42	262.5	36	37	58	12	37	0.65	0.51	0.28	p	0.64	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD149	107	65	58	36	220.3	25	34	53	13	28	0.55	0.61	0.23	p	0.64	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD15	140	94	89	51	664.5	37	58	90	19	42	0.54	0.67	0.26	p	0.64	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD152	105	71	58	36	221.4	21	34	71	11	35	0.51	0.68	0.20	p	0.48	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD153	107	65	57	33	202.2	31	38	56	10	25	0.51	0.61	0.29	p	0.68	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD154	98	57	52	34	163	26	31	51	9	31	0.60	0.58	0.27	p	0.61	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD155	108	56	39	37	181.3	34	27	53	12	35	0.66	0.52	0.31	p	0.51	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD156	98	57	47	35	163	18	30	57	12	34	0.61	0.58	0.18	p	0.53	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD161	82	55	51	29	125.5	31	26	52	15	19	0.53	0.67	0.38	o	0.50	0.18
Furze Platt	Furze Platt	ROM	Treacher	AD168	162	88	59	47	540.8	33	37	88	15	45	0.53	0.54	0.20	p	0.42	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD171	160	88	69	44	567.2	47	43	85	17	39	0.50	0.55	0.29	p	0.51	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD172	136	79	79	44	510.4	80	69	73	18	31	0.56	0.58	0.59	c	0.95	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD173	154	78	62	42	409.9	36	38	76	14	41	0.54	0.51	0.23	p	0.50	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD175	147	69	58	50	406.6	25	37	66	11	41	0.72	0.47	0.17	p	0.56	0.07

Furze Platt	Furze Platt	ROM	Treacher	AD176	140	77	61	41	333.2	39	34	68	14	33	0.53	0.55	0.28	p	0.50	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD177	150	82	58	41	375.1	27	35	75	14	37	0.50	0.55	0.18	p	0.47	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD182	152	69	56	41	322.1	22	35	66	13	39	0.59	0.45	0.14	p	0.53	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD183	129	74	55	41	339.6	17	35	74	15	38	0.55	0.57	0.13	p	0.47	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD185	159	81	62	34	427.6	48	42	78	17	30	0.42	0.51	0.30	p	0.54	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD189	127	87	80	49	548.5	41	65	83	15	41	0.56	0.69	0.32	p	0.78	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD19	139	77	73	54	520.1	35	51	74	17	49	0.70	0.55	0.25	p	0.69	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD190	125	72	68	42	346.8	44	47	66	18	38	0.58	0.58	0.35	o	0.71	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD196	109	64	59	39	221.5	38	27	64	11	43	0.61	0.59	0.35	p	0.42	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD199	113	66	64	34	239.6	47	36	55	14	34	0.52	0.58	0.42	o	0.65	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD2	115	63	60	32	225.6	36	37	61	17	36	0.51	0.55	0.31	p	0.61	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD204	110	70	65	39	255.8	33	42	62	15	32	0.56	0.64	0.30	p	0.68	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD205	107	66	55	34	222.3	15	36	66	15	29	0.52	0.62	0.14	p	0.55	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD21	117	75	72	45	330.2	45	52	56	14	39	0.60	0.64	0.38	o	0.93	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD211	99	59	58	29	200	25	38	49	12	28	0.49	0.60	0.25	p	0.78	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD213	109	58	41	35	167.9	21	26	58	13	33	0.60	0.53	0.19	p	0.45	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD214	93	63	62	38	180.7	42	48	50	15	35	0.60	0.68	0.45	o	0.96	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD215	96	63	63	33	201.7	42	35	54	18	22	0.52	0.66	0.44	o	0.65	0.19
Furze Platt	Furze Platt	ROM	Treacher	AD216	112	58	53	36	190.8	47	29	56	12	33	0.62	0.52	0.42	o	0.52	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD217	129	65	45	37	226.6	22	21	65	9	34	0.57	0.50	0.17	p	0.32	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD218	103	62	61	37	169.3	27	26	58	12	28	0.60	0.60	0.26	p	0.45	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD219	101	64	56	36	204.2	40	37	53	12	29	0.56	0.63	0.40	o	0.70	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD220	97	62	57	40	206.7	25	41	50	16	29	0.65	0.64	0.26	p	0.82	0.16

Furze Platt	Furze Platt	ROM	Treacher	AD221	120	56	35	41	166.9	18	20	54	7	38	0.73	0.47	0.15	p	0.37	0.06
Furze Platt	Furze Platt	ROM	Treacher	AD226	104	59	43	35	162.5	18	23	59	6	33	0.59	0.57	0.17	p	0.39	0.06
Furze Platt	Furze Platt	ROM	Treacher	AD227	109	53	41	34	142	16	24	50	14	30	0.64	0.49	0.15	p	0.48	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD231	171	92	87	71	949.6	60	46	70	35	66	0.77	0.54	0.35	o	0.66	0.20
Furze Platt	Furze Platt	ROM	Treacher	AD235	136	76	73	44	496.8	22	54	74	19	44	0.58	0.56	0.16	p	0.73	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD237	131	89	74	50	463.4	46	51	77	17	44	0.56	0.68	0.35	o	0.66	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD238	139	71	57	51	398.6	33	39	64	14	41	0.72	0.51	0.24	p	0.61	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD241	145	85	74	51	530.2	44	46	80	16	49	0.60	0.59	0.30	p	0.58	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD244	130	69	54	37	277.8	38	32	67	14	36	0.54	0.53	0.29	p	0.48	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD245	130	73	57	27	252.8	30	32	68	14	20	0.37	0.56	0.23	p	0.47	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD247	134	69	56	42	315.5	25	29	69	14	41	0.61	0.51	0.19	p	0.42	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD251	116	57	43	29	192.3	39	33	52	14	30	0.51	0.49	0.34	p	0.63	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD255	115	70	61	38	264.2	37	42	51	20	31	0.54	0.61	0.32	p	0.82	0.17
Furze Platt	Furze Platt	ROM	Treacher	AD258	99	55	49	33	151.3	14	31	54	10	32	0.60	0.56	0.14	p	0.57	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD261	127	70	42	35	250	19	26	69	14	34	0.50	0.55	0.15	p	0.38	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD262	89	47	45	24	104.5	34	24	41	14	20	0.51	0.53	0.38	o	0.59	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD264	153	79	64	39	402	32	35	79	12	35	0.49	0.52	0.21	p	0.44	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD269	192	93	67	51	647.1	44	44	89	15	49	0.55	0.48	0.23	p	0.49	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD272	149	73	70	44	432.5	31	40	72	15	44	0.60	0.49	0.21	p	0.56	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD277	153	62	47	51	349.5	50	34	57	15	48	0.82	0.41	0.33	p	0.60	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD280	143	67	60	36	325.3	28	41	65	14	32	0.54	0.47	0.20	p	0.63	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD287	105	58	54	33	184.6	28	34	53	11	23	0.57	0.55	0.27	p	0.64	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD291	119	54	45	35	160.3	45	18	43	9	32	0.65	0.45	0.38	o	0.42	0.08

Furze Platt	Furze Platt	ROM	Treacher	AD3	99	62	54	33	179.3	38	31	52	12	29	0.53	0.63	0.38	o	0.60	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD30	111	67	62	37	258.3	63	49	60	13	28	0.55	0.60	0.57	c	0.82	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD302	135	80	78	43	429.6	69	63	59	18	35	0.54	0.59	0.51	o	1.07	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD304	158	76	56	35	427.1	23	41	75	12	35	0.46	0.48	0.15	p	0.55	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD307	110	79	71	37	280.3	23	40	78	20	39	0.47	0.72	0.21	p	0.51	0.18
Furze Platt	Furze Platt	ROM	Treacher	AD309	132	73	57	34	262.8	28	29	73	12	35	0.47	0.55	0.21	p	0.40	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD31	118	48	63	32	214.4	29	31	51	12	27	0.67	0.41	0.25	p	0.61	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD310	126	64	59	35	277.8	40	33	59	13	30	0.55	0.51	0.32	p	0.56	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD314	124	74	70	57	461.8	52	54	64	19	45	0.77	0.60	0.42	o	0.84	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD32	96	67	56	37	202.2	10	28	67	11	30	0.55	0.70	0.10	p	0.42	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD320	109	65	61	32	199.8	30	37	58	15	25	0.49	0.60	0.28	p	0.64	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD323	99	53	46	32	146.7	28	27	49	10	30	0.60	0.54	0.28	p	0.55	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD328	117	58	37	30	150.3	21	24	58	11	28	0.52	0.50	0.18	p	0.41	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD329	106	58	50	34	187	29	31	55	9	33	0.59	0.55	0.27	p	0.56	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD33	113	68	67	23	166.4	56	44	57	7	21	0.34	0.60	0.50	o	0.77	0.06
Furze Platt	Furze Platt	ROM	Treacher	AD331	89	53	42	36	130.7	23	24	47	11	34	0.68	0.60	0.26	p	0.51	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD339	168	95	80	55	701.9	55	50	87	18	54	0.58	0.57	0.33	p	0.57	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD34	136	79	77	47	393.5	62	44	60	16	37	0.59	0.58	0.46	o	0.73	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD342	141	78	72	45	485.3	49	44	80	21	43	0.58	0.55	0.35	p	0.55	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD343	162	89	76	45	571.5	52	53	77	15	42	0.51	0.55	0.32	p	0.69	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD344	170	93	70	38	507	37	39	84	19	32	0.41	0.55	0.22	p	0.46	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD346	138	96	81	43	532	34	43	73	15	42	0.45	0.70	0.25	p	0.59	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD347	160	94	71	49	629	32	47	94	18	47	0.52	0.59	0.20	p	0.50	0.11

Furze Platt	Furze Platt	ROM	Treacher	AD348	127	76	56	48	380.3	29	33	75	15	37	0.63	0.60	0.23	p	0.44	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD349	137	78	75	41	379.5	50	36	67	17	35	0.53	0.57	0.36	o	0.54	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD350	137	69	54	37	322.5	17	34	66	22	37	0.54	0.50	0.12	p	0.52	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD353	139	72	70	58	530.8	81	61	68	18	49	0.81	0.52	0.58	c	0.90	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD356	122	80	76	33	329.4	59	63	65	15	24	0.41	0.66	0.48	o	0.97	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD358	110	71	71	42	319.2	51	50	55	18	37	0.59	0.65	0.46	o	0.91	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD361	104	67	66	37	260.6	58	55	62	14	32	0.55	0.64	0.56	c	0.89	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD365	120	93	70	48	359.9	20	42	90	15	44	0.52	0.78	0.17	p	0.47	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD369	84	54	46	30	114.9	20	27	53	11	25	0.56	0.64	0.24	p	0.51	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD371	92	51	50	36	141.3	59	42	42	12	32	0.71	0.55	0.64	c	1.00	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD373	107	52	43	35	149.3	21	22	51	9	28	0.67	0.49	0.20	p	0.43	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD374	178	88	81	50	684.8	54	51	81	19	50	0.57	0.49	0.30	p	0.63	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD375	185	102	82	57	934.7	36	61	100	21	52	0.56	0.55	0.19	p	0.61	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD376	164	84	82	48	615.7	56	63	62	16	45	0.57	0.51	0.34	p	1.02	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD378	170	93	72	54	699.6	42	45	90	21	51	0.58	0.55	0.25	p	0.50	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD379	148	72	61	42	399.9	31	37	72	12	42	0.58	0.49	0.21	p	0.51	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD38	105	52	46	32	146.5	22	26	51	14	29	0.62	0.50	0.21	p	0.51	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD380	135	83	73	39	423.6	39	49	73	17	36	0.47	0.61	0.29	p	0.67	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD381	143	83	78	44	446.5	59	51	67	16	35	0.53	0.58	0.41	o	0.76	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD382	154	80	63	39	433.7	47	40	76	15	37	0.49	0.52	0.31	p	0.53	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD384	132	83	80	37	408.7	44	49	75	17	25	0.45	0.63	0.33	p	0.65	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD387	140	82	76	40	430	47	42	71	16	39	0.49	0.59	0.34	p	0.59	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD388	123	68	58	37	274.6	26	37	63	15	35	0.54	0.55	0.21	p	0.59	0.12

Furze Platt	Furze Platt	ROM	Treacher	AD389	109	79	68	44	322.5	35	40	73	17	28	0.56	0.72	0.32	p	0.55	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD390	111	66	59	45	273.5	44	35	57	13	43	0.68	0.59	0.40	o	0.61	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD391	121	66	56	36	214.4	32	27	63	10	29	0.55	0.55	0.26	p	0.43	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD392	125	68	54	41	268.1	37	32	67	11	38	0.60	0.54	0.30	p	0.48	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD393	119	65	52	36	208.3	20	34	65	9	34	0.55	0.55	0.17	p	0.52	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD394	121	70	53	43	300.1	26	33	67	15	42	0.61	0.58	0.21	p	0.49	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD395	103	70	57	42	234.6	31	31	64	17	28	0.60	0.68	0.30	p	0.48	0.17
Furze Platt	Furze Platt	ROM	Treacher	AD398	123	60	47	31	203	31	27	60	8	33	0.52	0.49	0.25	p	0.45	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD399	112	69	67	45	298.3	54	54	62	15	39	0.65	0.62	0.48	o	0.87	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD4	113	68	54	51	265.8	32	36	67	14	46	0.75	0.60	0.28	p	0.54	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD40	205	114	105	52	1091.1	100	77	84	21	41	0.46	0.56	0.49	o	0.92	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD401	113	67	46	25	178.3	15	28	64	14	20	0.37	0.59	0.13	p	0.44	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD403	89	59	56	30	136.3	32	27	45	10	24	0.51	0.66	0.36	o	0.60	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD404	90	50	41	35	124.2	13	22	48	13	27	0.70	0.56	0.14	p	0.46	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD405	116	56	44	44	222.2	25	19	54	20	40	0.79	0.48	0.22	p	0.35	0.17
Furze Platt	Furze Platt	ROM	Treacher	AD406	114	65	51	38	192.3	27	31	61	10	36	0.58	0.57	0.24	p	0.51	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD408	83	65	62	31	163.3	21	33	61	15	26	0.48	0.78	0.25	p	0.54	0.18
Furze Platt	Furze Platt	ROM	Treacher	AD409	97	49	44	33	115.8	18	22	50	11	35	0.67	0.51	0.19	p	0.44	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD410	96	51	45	28	125.4	23	22	49	9	27	0.55	0.53	0.24	p	0.45	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD411	97	53	49	33	144.3	22	29	53	12	25	0.62	0.55	0.23	p	0.55	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD412	89	52	36	37	118.6	26	30	48	9	32	0.71	0.58	0.29	p	0.63	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD413	95	45	38	38	156.8	22	25	36	11	36	0.84	0.47	0.23	p	0.69	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD415	98	63	54	34	169	24	30	59	15	27	0.54	0.64	0.24	p	0.51	0.15

Furze Platt	Furze Platt	ROM	Treacher	AD416	80	44	44	42	101.9	27	28	39	12	23	0.95	0.55	0.34	p	0.72	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD417	92	52	44	35	128.5	23	27	50	8	25	0.67	0.57	0.25	p	0.54	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD418	81	49	41	37	124.4	17	29	47	13	33	0.76	0.60	0.21	p	0.62	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD42	149	92	76	46	486.1	53	49	82	14	39	0.50	0.62	0.36	o	0.60	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD422	131	94	92	47	566.3	77	79	86	26	43	0.50	0.72	0.59	c	0.92	0.20
Furze Platt	Furze Platt	ROM	Treacher	AD423	205	88	62	61	710.2	50	41	85	17	52	0.69	0.43	0.24	p	0.48	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD424	180	84	63	40	503.8	50	40	81	14	36	0.48	0.47	0.28	p	0.49	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD425	150	79	67	50	432.5	36	70	39	36	12	0.63	0.53	0.24	p	1.79	0.24
Furze Platt	Furze Platt	ROM	Treacher	AD429	164	86	78	47	657.6	55	64	73	16	45	0.55	0.52	0.34	p	0.88	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD43	137	77	70	35	368	34	48	69	13	32	0.45	0.56	0.25	p	0.70	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD432	180	90	78	52	752.4	28	45	87	18	49	0.58	0.50	0.16	p	0.52	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD433	169	83	75	57	660	45	52	80	18	45	0.69	0.49	0.27	p	0.65	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD434	177	95	92	48	786	73	77	72	22	44	0.51	0.54	0.41	o	1.07	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD435	136	80	72	41	367.4	40	43	77	13	33	0.51	0.59	0.29	p	0.56	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD436	130	93	73	47	486.3	29	49	89	15	46	0.51	0.72	0.22	p	0.55	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD437	154	74	57	46	452.5	45	32	73	12	43	0.62	0.48	0.29	p	0.44	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD438	130	73	62	37	373.7	48	46	68	15	34	0.51	0.56	0.37	o	0.68	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD44	147	93	64	54	495.2	34	38	81	17	47	0.58	0.63	0.23	p	0.47	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD442	130	77	70	45	368.5	53	56	64	15	43	0.58	0.59	0.41	o	0.88	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD443	134	80	78	46	398.5	60	50	65	15	37	0.58	0.60	0.45	o	0.77	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD447	125	77	72	42	380.8	44	52	68	21	32	0.55	0.62	0.35	o	0.76	0.17
Furze Platt	Furze Platt	ROM	Treacher	AD448	143	78	59	43	389.5	35	32	73	19	41	0.55	0.55	0.24	p	0.44	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD449	127	74	60	50	343	27	38	73	11	49	0.68	0.58	0.21	p	0.52	0.09

Furze Platt	Furze Platt	ROM	Treacher	AD46	157	84	71	45	538.8	48	53	79	17	40	0.54	0.54	0.31	p	0.67	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD463	114	67	61	36	264.8	26	40	64	15	32	0.54	0.59	0.23	p	0.63	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD466	108	68	62	28	181.8	39	33	55	11	22	0.41	0.63	0.36	o	0.60	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD467	117	70	69	51	381	55	52	59	20	34	0.73	0.60	0.47	o	0.88	0.17
Furze Platt	Furze Platt	ROM	Treacher	AD470	100	80	78	37	289	39	55	72	17	31	0.46	0.80	0.39	o	0.76	0.17
Furze Platt	Furze Platt	ROM	Treacher	AD474	145	87	58	51	461.7	36	34	79	10	41	0.59	0.60	0.25	p	0.43	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD487	120	67	59	36	251	39	29	63	14	34	0.54	0.56	0.33	p	0.46	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD5	123	62	48	21	191	33	28	62	18	22	0.34	0.50	0.27	p	0.45	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD50	158	85	76	51	659.9	52	63	69	20	38	0.60	0.54	0.33	p	0.91	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD509	106	69	58	35	195.4	28	30	56	13	30	0.51	0.65	0.26	p	0.54	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD516	92	56	54	40	178.6	30	35	46	12	36	0.71	0.61	0.33	p	0.76	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD517	107	52	48	25	147.9	59	34	43	14	26	0.48	0.49	0.55	c	0.79	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD52	127	71	61	44	300	42	35	62	11	40	0.62	0.56	0.33	p	0.56	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD521	107	64	62	32	190	33	38	61	9	22	0.50	0.60	0.31	p	0.62	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD53	150	79	59	49	448.1	29	33	77	13	47	0.62	0.53	0.19	p	0.43	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD54	135	69	41	46	308.2	22	27	67	11	45	0.67	0.51	0.16	p	0.40	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD56	103	67	65	33	239.2	64	49	54	21	26	0.49	0.65	0.62	c	0.91	0.20
Furze Platt	Furze Platt	ROM	Treacher	AD566	99	54	51	42	214.4	39	39	53	13	38	0.78	0.55	0.39	o	0.74	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD567	101	58	46	23	123.3	37	27	54	11	23	0.40	0.57	0.37	o	0.50	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD57	94	60	54	32	156.9	15	31	60	12	26	0.53	0.64	0.16	p	0.52	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD576	114	69	51	32	182	22	22	64	12	28	0.46	0.61	0.19	p	0.34	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD58	118	69	53	45	288.3	26	31	65	13	41	0.65	0.58	0.22	p	0.48	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD584	95	52	37	28	97.7	24	20	46	9	24	0.54	0.55	0.25	p	0.43	0.09

Furze Platt	Furze Platt	ROM	Treacher	AD586	96	54	52	33	123.7	35	28	37	11	21	0.61	0.56	0.36	o	0.76	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD587	121	49	42	25	137.3	51	26	40	10	22	0.51	0.40	0.42	o	0.65	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD59	135	69	48	30	191	29	25	66	11	23	0.43	0.51	0.21	p	0.38	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD592	146	86	64	46	496	35	34	72	21	42	0.53	0.59	0.24	p	0.47	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD593	148	78	60	37	358.6	30	39	75	12	33	0.47	0.53	0.20	p	0.52	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD594	138	73	69	40	372.7	56	37	59	21	30	0.55	0.53	0.41	o	0.63	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD596	121	71	56	36	256.5	31	39	67	12	28	0.51	0.59	0.26	p	0.58	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD6	108	61	46	39	221.2	41	25	54	15	38	0.64	0.56	0.38	o	0.46	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD600	107	74	55	27	198.3	12	30	73	9	26	0.36	0.69	0.11	p	0.41	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD601	106	60	54	35	170.1	22	33	57	10	32	0.58	0.57	0.21	p	0.58	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD61	105	68	64	24	159.2	33	42	64	8	23	0.35	0.65	0.31	p	0.66	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD619	100	57	48	39	152.9	28	29	56	9	38	0.68	0.57	0.28	p	0.52	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD628	97	41	35	21	69.5	25	20	38	7	20	0.51	0.42	0.26	p	0.53	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD63	125	56	51	34	167.5	51	30	39	10	31	0.61	0.45	0.41	o	0.77	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD632	200	93	63	47	684.5	53	38	84	16	44	0.51	0.47	0.27	p	0.45	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD639	166	85	69	48	460.9	54	39	78	14	35	0.56	0.51	0.33	p	0.50	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD64	130	63	46	45	325.9	22	30	63	19	43	0.71	0.48	0.17	p	0.48	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD640	153	71	53	54	373	42	37	63	14	54	0.76	0.46	0.27	p	0.59	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD642	150	81	58	53	452.2	38	32	76	16	47	0.65	0.54	0.25	p	0.42	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD644	175	102	100	55	778	76	68	87	24	35	0.54	0.58	0.43	o	0.78	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD647	157	83	83	51	578.6	70	53	64	16	39	0.61	0.53	0.45	o	0.83	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD649	148	92	59	38	383.7	21	35	89	13	32	0.41	0.62	0.14	p	0.39	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD651	167	86	80	34	328.1	41	50	84	13	28	0.40	0.51	0.25	p	0.60	0.08

Furze Platt	Furze Platt	ROM	Treacher	AD654	144	74	57	27	267.5	32	33	70	11	22	0.36	0.51	0.22	p	0.47	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD655	165	81	63	36	425.2	40	35	74	15	27	0.44	0.49	0.24	p	0.47	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD656	138	81	44	35	273.7	21	31	76	9	30	0.43	0.59	0.15	p	0.41	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD657	133	73	59	33	306.2	24	36	72	17	35	0.45	0.55	0.18	p	0.50	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD66	117	67	54	38	222.5	28	32	64	9	38	0.57	0.57	0.24	p	0.50	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD660	151	78	57	37	361.6	32	36	77	9	31	0.47	0.52	0.21	p	0.47	0.06
Furze Platt	Furze Platt	ROM	Treacher	AD661	114	58	53	28	181	35	37	54	14	26	0.48	0.51	0.31	p	0.69	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD663	100	45	42	34	130.4	35	22	41	9	32	0.76	0.45	0.35	p	0.54	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD667	154	90	86	45	536.3	56	59	75	18	36	0.50	0.58	0.36	o	0.79	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD668	174	87	63	52	660.2	63	39	83	21	46	0.60	0.50	0.36	o	0.47	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD670	180	90	60	33	493.8	31	36	88	29	15	0.37	0.50	0.17	p	0.41	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD671	171	91	80	51	723.9	67	51	80	15	48	0.56	0.53	0.39	o	0.64	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD672	137	85	75	48	510.9	33	51	77	16	43	0.56	0.62	0.24	p	0.66	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD679	170	80	44	32	312.5	22	26	76	12	33	0.40	0.47	0.13	p	0.34	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD680	117	73	73	35	278.1	59	65	46	13	28	0.48	0.62	0.50	o	1.41	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD682	128	70	56	38	273.9	35	31	69	14	30	0.54	0.55	0.27	p	0.45	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD683	127	71	64	30	250.7	29	31	69	11	29	0.42	0.56	0.23	p	0.45	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD685	177	84	74	51	462.6	63	49	49	15	44	0.61	0.47	0.36	o	1.00	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD686	120	70	62	43	287.3	32	35	65	12	39	0.61	0.58	0.27	p	0.54	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD687	103	69	64	37	237	72	64	55	10	29	0.54	0.67	0.70	c	1.16	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD689	115	59	38	25	149	17	20	51	10	22	0.42	0.51	0.15	p	0.39	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD693	112	58	54	40	211.2	36	34	51	11	40	0.69	0.52	0.32	p	0.67	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD697	97	54	47	29	141.3	24	29	52	12	28	0.54	0.56	0.25	p	0.56	0.12

Furze Platt	Furze Platt	ROM	Treacher	AD698	103	58	42	24	115.3	22	23	52	8	22	0.41	0.56	0.21	p	0.44	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD7	86	59	46	31	133.7	23	27	52	14	27	0.53	0.69	0.27	p	0.52	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD700	97	51	46	33	90.2	35	28	44	12	30	0.65	0.53	0.36	o	0.64	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD701	79	57	55	34	143.5	33	39	55	11	33	0.60	0.72	0.42	o	0.71	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD702	227	102	78	67	1190.2	40	51	98	26	66	0.66	0.45	0.18	p	0.52	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD703	211	102	77	51	915.9	29	47	99	20	51	0.50	0.48	0.14	p	0.47	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD704	237	111	94	52	1135.8	66	55	99	15	52	0.47	0.47	0.28	p	0.56	0.06
Furze Platt	Furze Platt	ROM	Treacher	AD705	215	100	66	72	937.8	36	31	96	14	64	0.72	0.47	0.17	p	0.32	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD707	197	104	74	48	823.7	45	50	104	16	44	0.46	0.53	0.23	p	0.48	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD708	230	88	48	64	898.2	34	39	82	22	62	0.73	0.38	0.15	p	0.48	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD709	242	102	54	69	1130.2	40	34	94	21	63	0.68	0.42	0.17	p	0.36	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD71	104	53	44	31	132.8	19	26	53	9	29	0.58	0.51	0.18	p	0.49	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD710	177	84	67	47	566.3	54	40	80	14	43	0.56	0.47	0.31	p	0.50	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD711	166	93	58	60	567.3	46	33	73	13	60	0.65	0.56	0.28	p	0.45	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD712	166	82	62	48	518	41	36	71	18	43	0.59	0.49	0.25	p	0.51	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD713	169	88	60	39	460.6	41	30	87	11	36	0.44	0.52	0.24	p	0.34	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD714	136	75	50	39	260.7	28	29	74	10	34	0.52	0.55	0.21	p	0.39	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD715	161	83	63	41	418.8	32	33	83	8	38	0.49	0.52	0.20	p	0.40	0.05
Furze Platt	Furze Platt	ROM	Treacher	AD716	159	79	61	39	385.7	25	32	75	11	28	0.49	0.50	0.16	p	0.43	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD753	87	61	52	42	181.3	20	26	57	17	31	0.69	0.70	0.23	p	0.46	0.20
Furze Platt	Furze Platt	ROM	Treacher	AD755	114	68	55	38	235	23	32	68	13	36	0.56	0.60	0.20	p	0.47	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD757	103	69	60	37	217.6	20	37	67	10	34	0.54	0.67	0.19	p	0.55	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD760	119	63	62	46	317.5	46	47	60	16	41	0.73	0.53	0.39	o	0.78	0.13

Furze Platt	Furze Platt	ROM	Treacher	AD761	114	71	67	50	345.8	47	40	69	18	37	0.70	0.62	0.41	o	0.58	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD767	115	52	32	36	173.1	17	20	50	12	38	0.69	0.45	0.15	p	0.40	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD772	140	66	57	37	350.6	35	41	63	15	31	0.56	0.47	0.25	p	0.65	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD776	143	76	52	46	360.1	30	27	76	12	45	0.61	0.53	0.21	p	0.36	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD778	155	100	75	41	509.1	44	48	89	15	21	0.41	0.65	0.28	p	0.54	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD779	172	88	71	54	570.6	48	48	77	15	50	0.61	0.51	0.28	p	0.62	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD780	150	70	67	45	448.7	80	44	63	13	39	0.64	0.47	0.53	o	0.70	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD781	144	79	58	48	423.3	36	36	76	18	48	0.61	0.55	0.25	p	0.47	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD783	141	83	82	33	388.3	62	49	73	19	33	0.40	0.59	0.44	o	0.67	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD79	90	78	75	42	323.9	15	54	78	29	37	0.54	0.87	0.17	p	0.69	0.32
Furze Platt	Furze Platt	ROM	Treacher	AD793	152	97	86	44	617.3	32	53	94	19	38	0.45	0.64	0.21	p	0.56	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD796	165	85	59	51	513.9	41	36	81	17	46	0.60	0.52	0.25	p	0.44	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD799	164	92	65	51	556.5	27	39	92	18	47	0.55	0.56	0.16	p	0.42	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD8	90	50	43	35	121	28	29	44	8	31	0.70	0.56	0.31	p	0.66	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD800	159	76	55	44	376.9	25	30	75	11	43	0.58	0.48	0.16	p	0.40	0.07
Furze Platt	Furze Platt	ROM	Treacher	AD802	133	73	51	33	268.5	19	28	74	14	33	0.45	0.55	0.14	p	0.38	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD805	129	83	63	42	355.1	28	35	77	15	40	0.51	0.64	0.22	p	0.45	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD808	157	83	66	55	764.3	32	61	82	24	54	0.66	0.53	0.20	p	0.74	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD809	140	65	49	37	282.2	27	24	65	12	36	0.57	0.46	0.19	p	0.37	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD809	132	80	78	41	381.3	57	52	71	11	39	0.51	0.61	0.43	o	0.73	0.08
Furze Platt	Furze Platt	ROM	Treacher	AD81	120	68	58	45	279.9	25	39	67	12	41	0.66	0.57	0.21	p	0.58	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD810	193	109	105	68	1059.5	148	107	90	25	48	0.62	0.56	0.77	c	1.19	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD811	113	51	32	35	138.7	19	22	49	11	35	0.69	0.45	0.17	p	0.45	0.10

Furze Platt	Furze Platt	ROM	Treacher	AD813	133	80	79	41	420.5	70	43	65	15	32	0.51	0.60	0.53	o	0.66	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD814	179	92	76	46	674.9	31	43	90	21	42	0.50	0.51	0.17	p	0.48	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD815	159	104	96	48	810.1	55	56	96	28	38	0.46	0.65	0.35	p	0.58	0.18
Furze Platt	Furze Platt	ROM	Treacher	AD816	164	99	67	49	669.5	35	45	98	16	47	0.49	0.60	0.21	p	0.46	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD820	109	54	47	31	178.6	39	25	47	14	23	0.57	0.50	0.36	o	0.53	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD822	129	80	80	58	494.8	49	61	75	14	57	0.73	0.62	0.38	o	0.81	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD824	123	67	62	54	308.3	43	38	55	15	44	0.81	0.54	0.35	p	0.69	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD825	120	87	68	43	394	14	57	83	14	41	0.49	0.73	0.12	p	0.69	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD826	147	75	72	45	456.2	54	44	70	22	29	0.60	0.51	0.37	o	0.63	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD827	104	70	61	41	271.5	33	47	62	11	39	0.59	0.67	0.32	p	0.76	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD828	87	65	62	45	252.9	26	39	62	18	39	0.69	0.75	0.30	p	0.63	0.21
Furze Platt	Furze Platt	ROM	Treacher	AD829	103	66	42	47	227.8	14	23	63	10	44	0.71	0.64	0.14	p	0.37	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD832	113	69	64	47	359.4	36	49	64	15	44	0.68	0.61	0.32	p	0.77	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD833	153	76	72	46	455.1	68	45	59	17	43	0.61	0.50	0.44	o	0.76	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD834	134	81	73	41	364.1	47	49	66	15	29	0.51	0.60	0.35	o	0.74	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD834	116	55	54	21	135.9	51	29	44	10	16	0.38	0.47	0.44	o	0.66	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD835	121	72	69	35	341.3	56	54	63	18	32	0.49	0.60	0.46	o	0.86	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD836	109	71	69	42	292.2	45	59	63	15	37	0.59	0.65	0.41	o	0.94	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD837	200	113	105	57	1139.3	77	76	76	23	38	0.50	0.57	0.39	o	1.00	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD838	124	79	77	35	388.5	42	51	75	20	30	0.44	0.64	0.34	p	0.68	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD839	129	81	76	54	480.3	48	58	65	23	50	0.67	0.63	0.37	o	0.89	0.18
Furze Platt	Furze Platt	ROM	Treacher	AD84	125	64	59	43	294.2	70	46	47	11	42	0.67	0.51	0.56	c	0.98	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD840	124	65	54	53	366.9	43	37	59	16	37	0.82	0.52	0.35	p	0.63	0.13

Furze Platt	Furze Platt	ROM	Treacher	AD841	116	74	72	37	300.9	56	63	47	18	28	0.50	0.64	0.48	o	1.34	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD843	105	56	48	31	143.1	29	26	53	10	24	0.55	0.53	0.28	p	0.49	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD844	109	61	49	41	212.6	25	26	59	12	36	0.67	0.56	0.23	p	0.44	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD844	123	90	89	41	412.3	54	51	76	17	28	0.46	0.73	0.44	o	0.67	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD845	111	70	58	40	228	32	30	56	13	40	0.57	0.63	0.29	p	0.54	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD849	141	83	78	42	476.1	63	52	76	19	42	0.51	0.59	0.45	o	0.68	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD850	116	80	76	41	351	50	59	69	18	35	0.51	0.69	0.43	o	0.86	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD851	104	65	51	49	262.4	13	38	63	16	49	0.75	0.63	0.13	p	0.60	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD852	96	55	53	41	231.3	41	39	54	13	40	0.75	0.57	0.43	o	0.72	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD854	163	89	67	39	526.8	19	41	87	16	38	0.44	0.55	0.12	p	0.47	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD854	110	63	51	35	200.3	34	39	56	12	37	0.56	0.57	0.31	p	0.70	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD855	97	60	50	40	187.7	25	29	57	14	34	0.67	0.62	0.26	p	0.51	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD857	147	101	99	47	751.1	68	75	75	24	42	0.47	0.69	0.46	o	1.00	0.16
Furze Platt	Furze Platt	ROM	Treacher	AD858	147	72	68	47	518	46	54	63	19	42	0.65	0.49	0.31	p	0.86	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD86	108	68	59	44	273.2	30	33	63	18	40	0.65	0.63	0.28	p	0.52	0.17
Furze Platt	Furze Platt	ROM	Treacher	AD860	143	79	70	43	418.3	34	35	73	14	34	0.54	0.55	0.24	p	0.48	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD861	111	68	61	39	301.8	46	43	63	20	24	0.57	0.61	0.41	o	0.68	0.18
Furze Platt	Furze Platt	ROM	Treacher	AD862	104	69	64	47	354.6	37	47	66	16	46	0.68	0.66	0.36	o	0.71	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD862	131	73	71	49	397.7	53	62	65	16	41	0.67	0.56	0.40	o	0.95	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD864	134	65	54	35	316.2	36	37	64	16	32	0.54	0.49	0.27	p	0.58	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD864	144	72	70	44	422.3	37	47	63	20	33	0.61	0.50	0.26	p	0.75	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD867	133	63	57	27	213.6	38	37	61	13	20	0.43	0.47	0.29	p	0.61	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD868	136	64	56	40	322.5	24	37	66	14	28	0.63	0.47	0.18	p	0.56	0.10

Furze Platt	Furze Platt	ROM	Treacher	AD870	104	67	54	33	200	28	31	64	14	31	0.49	0.64	0.27	p	0.48	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD871	105	53	48	37	225.1	62	44	49	13	38	0.70	0.50	0.59	c	0.90	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD872	96	59	58	29	159.3	45	40	51	14	28	0.49	0.61	0.47	o	0.78	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD874	111	66	41	45	249.5	15	24	62	14	39	0.68	0.59	0.14	p	0.39	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD875	138	81	79	40	431.7	61	62	59	17	33	0.49	0.59	0.44	o	1.05	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD876	104	63	59	38	186.7	32	32	57	13	29	0.60	0.61	0.31	p	0.56	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD877	120	63	45	28	154.7	33	27	57	14	26	0.44	0.53	0.28	p	0.47	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD878	100	77	71	32	225.4	31	38	69	15	23	0.42	0.77	0.31	p	0.55	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD879	125	73	54	30	229.7	31	31	66	11	24	0.41	0.58	0.25	p	0.47	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD880	122	59	53	33	212.9	43	37	54	14	23	0.56	0.48	0.35	o	0.69	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD881	102	52	40	28	125.2	12	22	50	13	28	0.54	0.51	0.12	p	0.44	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD881	124	66	59	54	345	46	45	59	16	43	0.82	0.53	0.37	o	0.76	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD882	114	70	63	41	297.2	23	39	68	16	35	0.59	0.61	0.20	p	0.57	0.14
Furze Platt	Furze Platt	ROM	Treacher	AD883	125	65	58	43	274.2	47	33	56	13	39	0.66	0.52	0.38	o	0.59	0.10
Furze Platt	Furze Platt	ROM	Treacher	AD884	130	73	66	39	288.3	38	31	69	12	34	0.53	0.56	0.29	p	0.45	0.09
Furze Platt	Furze Platt	ROM	Treacher	AD885	120	65	56	45	270.6	34	32	57	16	33	0.69	0.54	0.28	p	0.56	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD886	111	61	51	32	205.4	40	41	51	14	27	0.52	0.55	0.36	o	0.80	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD886	120	72	70	42	424.5	57	57	56	21	39	0.58	0.60	0.48	o	1.02	0.18
Furze Platt	Furze Platt	ROM	Treacher	AD887	135	79	79	48	477.1	67	55	73	15	35	0.61	0.59	0.50	o	0.75	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD89	113	68	63	30	236	43	52	53	15	27	0.44	0.60	0.38	o	0.98	0.13
Furze Platt	Furze Platt	ROM	Treacher	AD893	80	44	44	22	95.8	36	34	39	9	25	0.50	0.55	0.45	o	0.87	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD9	81	48	41	36	104.5	32	19	43	9	28	0.75	0.59	0.40	o	0.44	0.11
Furze Platt	Furze Platt	ROM	Treacher	AD91	91	63	63	42	247.4	36	48	56	19	36	0.67	0.69	0.40	o	0.86	0.21

Furze Platt	Furze Platt	ROM	Treacher	AD92	90	65	59	27	182.3	25	48	64	11	24	0.42	0.72	0.28	p	0.75	0.12
Furze Platt	Furze Platt	ROM	Treacher	AD93	95	62	61	28	162.8	49	44	56	14	18	0.45	0.65	0.52	o	0.79	0.15
Furze Platt	Furze Platt	ROM	Treacher	AD94	97	59	48	46	206.8	28	30	55	17	43	0.78	0.61	0.29	p	0.55	0.18

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Furze Platt	1A11/1.1	F	rolled		u	0	25	b	0	3.59						x			
Furze Platt	1A11/1.2	HK	rolled		f	0	0	n	2	2.36									
Furze Platt	1A11/12.1	E	slightly rolled		p	0	35	a	1	4.89									
Furze Platt	1A11/2.1	F	rolled		f	0	10	b	2	2.49		x							
Furze Platt	1A11/2.2	FM	slightly rolled		f	0	20	m	0	7.09				x					
Furze Platt	1A11/2.3	G	slightly rolled		f	0	0	n	2	3.72								x	
Furze Platt	1A11/2.4	F	slightly rolled		p	0	10	b	2	2.45									
Furze Platt	1A11/22.1	K	rolled		f	0	0	n	2	2.3								x	
Furze Platt	1A11/22.2	F	rolled		f	0	5	m	2	5.58									
Furze Platt	1A11/22.3	F	slightly rolled		p	0	5	b	2	3.32		x							
Furze Platt	1A11/5.1	FG	slightly rolled		u	0	10	b	0	3.59									
Furze Platt	1A11/5.2	M	slightly rolled		p	0	15	a	0	6.5			x						
Furze Platt	1A11/6.1	FG	rolled		p	0	10	b	2	7.22				x				x	x
Furze Platt	1A11/6.2	DK	rolled		f	0	5	m	2	5.6									
Furze Platt	1A11/7.1	M	slightly rolled		p	0	5	b	0	2.31			x						
Furze Platt	1A11/7.2	F	very rolled		p	0	15	b	0	2.36									
Furze Platt	1A12/1.2	E	slightly rolled		f	0	0	n	2	7.68									x
Furze Platt	1A12/15.1	GH	slightly rolled		p	1	5	b	2	7.01									x
Furze Platt	1A12/15.2	D	rolled		p	0	30	a	0	7.48						x			
Furze Platt	1A12/15.3	DF	rolled		u	0	45	b	0	13.47									

Furze Platt	1A12/16.1	K	very rolled	p	0	10	b	2	3.74								
Furze Platt	1A12/16.2	JK	very rolled	p	0	5	b	2	6.67							x	
Furze Platt	1A12/16.3	D	very rolled	p	0	10	a	0	11.45								
Furze Platt	1A12/16.4	FG	very rolled	f	0	0	n	2	6.16								
Furze Platt	1A12/16.5	E	rolled	u	0	35	b	0	5.26								
Furze Platt	1A12/16.6	DF	rolled	p	1	50	a	0	8.88			x					
Furze Platt	1A12/17.1	F	slightly rolled	p	0	5	a	0	3.91								
Furze Platt	1A12/17.2	G	slightly rolled	f	0	0	n	2	7.96							x	
Furze Platt	1A12/18.1	FG	rolled	p	0	35	b	2	5.04				x				
Furze Platt	1A12/18.2	GH	slightly rolled	p	0	30	a	0	4.98		x			x			
Furze Platt	1A12/18.3	FG	slightly rolled	p	1	30	a	0	2.77		x	x					
Furze Platt	1A12/18.4	GK	rolled	f	0	5	m	2	9.62								
Furze Platt	1A12/18.5	E	very fresh	f	0	5	m	2	6.65								
Furze Platt	1A12/19.1	M	rolled	u	0	35	b	0	5.18			x					x
Furze Platt	1A12/19.2	E	slightly rolled	p	0	5	b	2	5.87				x				
Furze Platt	1A12/19.3	G	rolled	f	0	25	a	2	7.77	x							
Furze Platt	1A12/19.4	DF	rolled	f	1	20	m	0	9.63				x	x			
Furze Platt	1A12/19.5	E	rolled	f	0	5	m	1	4.32	x							
Furze Platt	1A12/19.6	G	rolled	f	1	0	n	2	4.64								
Furze Platt	1A12/2.1	GK	rolled	f	0	15	m	2	8.93								x
Furze Platt	1A12/20.1	E	rolled	f	0	5	m	2	6.92								
Furze Platt	1A12/20.2	F	rolled	f	0	0	n	2	4.37						x		
Furze Platt	1A12/20.3	DF	rolled	p	0	5	b	2	5.34						x		

Furze Platt	1A12/20.4	F	rolled	p	0	10	b	2	2.5			x			
Furze Platt	1A12/20.5	G	rolled	f	0	25	m	0	5.59				x		
Furze Platt	1A12/20.6	E	rolled	f	0	15	m	0	11.03	x					
Furze Platt	1A12/20.7	EF	rolled	u	0	30	b	0	6.48	x	x				
Furze Platt	1A12/21.1	G	rolled	f	0	0	n	2	3.28					x	
Furze Platt	1A12/21.2	FG	very rolled	u	0	25	b	0	4.55			x			
Furze Platt	1A12/21.3	EF	very rolled	f	0	0	n	2	3.05						
Furze Platt	1A12/21.4	DF	very rolled	u	0	60	b	0	12.26				x		
Furze Platt	1A12/21.5	FM	very rolled	p	0	20	b	2	5.8	x					
Furze Platt	1A12/21.6	D	very rolled	u	0	20	b	0	5.29	x					
Furze Platt	1A12/22.1	D	very rolled	p	0	45	a	0	8.81	x					
Furze Platt	1A12/22.2	E	slightly rolled	u	0	10	b	2	5.57						
Furze Platt	1A12/22.3	D	very rolled	u	0	80	b	0	9.61				x		
Furze Platt	1A12/22.4	GK	rolled	p	1	5	b	2	5.47					x	
Furze Platt	1A12/22.5	GK	slightly rolled	f	0	15	m	2	3.32					x	
Furze Platt	1A12/22.6	E	slightly rolled	p	0	10	a	0	8.12						
Furze Platt	1A13/1.2	F	slightly rolled	u	0	25	b	0	2.84						x
Furze Platt	1A13/1.3	E	slightly rolled	f	0	10	m	2	6.16						
Furze Platt	1A13/1.4	G	slightly rolled	f	0	0	n	2	4.44		x				
Furze Platt	1A13/1.5	F	slightly rolled	u	0	40	b	0	9.17						
Furze Platt	1A13/1.6	FG	slightly rolled	f	0	0	n	2	4.49						
Furze Platt	1A13/1.7	DF	rolled	f	0	5	m	2	6.45			x			
Furze Platt	1A13/10.1	J	very fresh	f	0	10	m	1	2.59		x				

Furze Platt	1A13/10.2	DF	very fresh	p	0	30	b	0	5.38		x			
Furze Platt	1A13/10.3	DF	very fresh	p	0	40	a	0	6.91				x	
Furze Platt	1A13/10.4	F	very fresh	u	0	35	b	0	3.95					
Furze Platt	1A13/10.5	F	slightly rolled	f	0	0	n	2	2.09					
Furze Platt	1A13/11.1	M	very fresh	u	0	60	b	0	5.29		x		x	
Furze Platt	1A13/11.2	F	slightly rolled	p	1	15	b	2	6.31					
Furze Platt	1A13/11.3	M	slightly rolled	f	0	5	m	0	2.66		x			
Furze Platt	1A13/11.4	H	very fresh	f	0	5	m	0	5.85			x		
Furze Platt	1A13/11.5	FM	slightly rolled	p	0	10	b	2	2.49		x			
Furze Platt	1A13/11.6	FM	slightly rolled	u	0	15	b	0	10.24		x			
Furze Platt	1A13/12.1	D	very rolled	u	0	30	a	0	9.12					
Furze Platt	1A13/12.2	G	rolled	f	0	15	m	2	8.04	x				
Furze Platt	1A13/12.3	E	rolled	p	0	5	b	2	4.05					
Furze Platt	1A13/12.4	GH	rolled	f	0	15	m	2	5.34					
Furze Platt	1A13/13.1	F	very rolled	f	0	20	m	0	7.63				x	
Furze Platt	1A13/13.2	HK	very rolled	f	0	15	m	0	7.34				x	
Furze Platt	1A13/13.3	FG	very rolled	p	0	35	a	0	8.19			x		
Furze Platt	1A13/13.4	DK	very rolled	f	0	15	m	2	6.18			x	x	
Furze Platt	1A13/14.1	HK	slightly rolled	f	0	15	m	2	4.26					
Furze Platt	1A13/14.2	FG	slightly rolled	f	0	15	m	2	4.53			x		
Furze Platt	1A13/14.3	G	slightly rolled	f	0	0	n	2	4.51					
Furze Platt	1A13/15.1	F	rolled	f	0	0	n	2	6.05					x
Furze Platt	1A13/15.2	F	slightly rolled	p	0	20	b	0	2.73					

Furze Platt	1A13/15.3	GK	slightly rolled	p	0	10	b	2	3.2							
Furze Platt	1A13/15.4	HK	slightly rolled	f	1	0	n	2	6.11							
Furze Platt	1A13/16.1	GK	slightly rolled	f	0	10	m	2	3.21							
Furze Platt	1A13/16.2	D	slightly rolled	u	0	30	b	0	7.14							
Furze Platt	1A13/16.3	E	slightly rolled	f	0	0	n	2	8.42				x			
Furze Platt	1A13/16.4	K	slightly rolled	p	0	15	a	0	4.25					x		
Furze Platt	1A13/17.1	E	slightly rolled	f	0	0	n	2	5.11						x	
Furze Platt	1A13/17.2	EF	very fresh	p	0	10	a	2	4.29							
Furze Platt	1A13/17.3	L	slightly rolled	u	0	45	a	0	9.01					x		
Furze Platt	1A13/17.4	J	very fresh	p	1	10	b	1	7.48							
Furze Platt	1A13/17.5	DF	slightly rolled	p	0	10	b	2	3.8			x				
Furze Platt	1A13/18.1	E	very fresh	p	0	20	b	2	6.35							
Furze Platt	1A13/18.2	DK	rolled	p	0	25	a	2	5.61							x
Furze Platt	1A13/18.3	F	very fresh	u	0	20	a	0	5.34							
Furze Platt	1A13/18.4	F	slightly rolled	p	0	30	a	2	4.03		x					
Furze Platt	1A13/2.1	D	slightly rolled	f	0	0	n	2	3.4							x
Furze Platt	1A13/2.2	F	slightly rolled	f	0	10	a	2	5.91							
Furze Platt	1A13/2.3	FG	slightly rolled	f	0	20	m	2	5.04	x						
Furze Platt	1A13/2.4	E	slightly rolled	u	0	10	b	0	5.93							
Furze Platt	1A13/2.5	E	slightly rolled	f	0	0	n	2	3.39		x					
Furze Platt	1A13/20.1	D	rolled	f	0	0	n	2	7.45							
Furze Platt	1A13/20.2	F	slightly rolled	f	0	0	n	2	6.53							
Furze Platt	1A13/20.3	FG	rolled	u	1	20	b	0	6.21							

Furze Platt	1A13/21.1	H	slightly rolled	p	0	10	b	2	7.49							
Furze Platt	1A13/21.2	H	slightly rolled	f	0	0	n	2	4.07							
Furze Platt	1A13/21.3	HK	rolled	p	0	30	a	2	12.23						x	
Furze Platt	1A13/21.4	H	very rolled	p	0	10	b	0	4.87							
Furze Platt	1A13/22.1	H	slightly rolled	p	0	10	b	2	8.82							
Furze Platt	1A13/22.2	H	rolled	p	0	20	a	0	7.4							
Furze Platt	1A13/22.3	GH	rolled	f	0	0	n	2	2.98							
Furze Platt	1A13/3.1	F	slightly rolled	f	1	10	m	0	4.28							
Furze Platt	1A13/3.2	DK	slightly rolled	f	0	5	b	2	6.83	x						
Furze Platt	1A13/3.3	GH	very fresh	p	1	15	a	0	6.05							
Furze Platt	1A13/3.4	FG	rolled	u	0	20	b	0	3.94				x			
Furze Platt	1A13/4.1	F	slightly rolled	p	0	10	b	0	5.65					x		
Furze Platt	1A13/4.2	F	slightly rolled	f	0	5	m	2	2.8							x
Furze Platt	1A13/5.1	FM	slightly rolled	p	0	30	b	0	5.67		x					
Furze Platt	1A13/5.2	F	slightly rolled	p	0	10	a	0	4.21	x						
Furze Platt	1A13/5.3	FM	slightly rolled	p	0	40	b	2	5.62			x				
Furze Platt	1A13/6.1	F	slightly rolled	p	0	10	b	2	4.18							x
Furze Platt	1A13/6.2	G	slightly rolled	f	0	5	m	2	6.62						x	
Furze Platt	1A13/7.1	FG	slightly rolled	p	0	10	b	2	6.9							
Furze Platt	1A13/7.2	DF	slightly rolled	f	0	10	m	2	7.02							
Furze Platt	1A13/7.3	M	slightly rolled	f	0	0	n	2	4.64		x					
Furze Platt	1A13/7.4	M	slightly rolled	u	0	20	b	0	3.55		x					
Furze Platt	1A13/8.1	D	rolled	f	0	40	m	0	4.56				x			

Furze Platt	1A13/8.2	G	slightly rolled		f	0	5	m	2	3.17							
Furze Platt	1A13/8.3	FG	rolled		p	0	20	a	2	2.69							
Furze Platt	1A13/8.4	D	slightly rolled		p	0	15	b	2	7.72							
Furze Platt	1A13/8.5	DF	slightly rolled		p	0	20	b	2	5.87							x
Furze Platt	1A13/9.1	D	rolled		f	0	0	n	1	3.81							
Furze Platt	1A13/9.3	D	slightly rolled		f	0	5	m	1	5.38					x		
Furze Platt	1A13/9.4	FG	slightly rolled		p	0	20	b	1	9.28	x						
Furze Platt	1A14/10.1	F	slightly rolled		p	0	5	a	2	3.14		x					
Furze Platt	1A14/11.1	EF	slightly rolled		u	0	45	b	0	4.12					x		
Furze Platt	1A14/11.2	F	rolled		p	0	15	a	0	3.84							
Furze Platt	1A14/12.1	DF	rolled		f	0	15	m	2	5.49							
Furze Platt	1A14/12.2	DF	rolled		p	0	10	b	2	6.07						x	
Furze Platt	1A14/12.3	K	slightly rolled		f	0	0	n	2	5.29				x			
Furze Platt	1A14/12.4	FG	very fresh		u	0	40	b	0	5.96					x		
Furze Platt	1A14/13.1	F	slightly rolled		f	0	15	m	2	6.64						x	
Furze Platt	1A14/13.2	E	slightly rolled		f	0	0	n	2	7.5							
Furze Platt	1A14/13.3	G	slightly rolled		f	0	0	n	2	4.64						x	
Furze Platt	1A14/15.1	M	slightly rolled	35	f	0	5	m	2	3.9			x				
Furze Platt	1A14/15.2	F	rolled		f	0	5	m	2	4.68							x
Furze Platt	1A14/3.1	H	rolled		p	0	20	b	0	5.76						x	
Furze Platt	1A14/3.2	GH	rolled		f	0	10	m	0	4.96							
Furze Platt	1A14/3.3	H	slightly rolled		p	1	25	a	0	3.85							
Furze Platt	1A14/4.1	GH	slightly rolled		p	0	5	b	2	4.55		x				x	

Furze Platt	1A14/4.2	GH	slightly rolled		p	0	30	a	2	9.01								
Furze Platt	1A14/5.1	DK	rolled		p	0	30	a	0	8.25						x		
Furze Platt	1A14/5.2	F	rolled		f	0	10	m	0	4.56								x
Furze Platt	1A14/5.3	GH	rolled		p	0	5	a	2	4.19								
Furze Platt	930x85.32	HK	very fresh	24	f	0	5	m	1	5.28								
Furze Platt	AD1	F	slightly rolled	27	p	0	20	a	0	12.56	x			x		x		
Furze Platt	AD103	M	very fresh	26	p	0	5	b	2	2.38			x					
Furze Platt	AD1041	JK	slightly rolled	28	f	0	0	n	2	1.66								
Furze Platt	AD1042	K	rolled	44	f	1	0	n	2	4.29								
Furze Platt	AD1044	J	slightly rolled	45	f	0	0	n	2	5.03								
Furze Platt	AD1045	E	slightly rolled	15	p	0	25	b	1	4.33		x						
Furze Platt	AD1046	G	rolled	33	u	0	35	a	0	4.61								
Furze Platt	AD106	E	slightly rolled	23	u	0	35	b	0	3.01		x						
Furze Platt	AD108	DF	slightly rolled	21	f	0	10	m	0	5.01	x							
Furze Platt	AD1089	F	rolled	18	f	0	5	m	1	5.44								
Furze Platt	AD117	E	slightly rolled	18	u	0	20	b	0	4.14								
Furze Platt	AD120	EF	rolled	32	f	0	5	m	1	2.22		x						
Furze Platt	AD121	E	slightly rolled	12	p	0	55	b	0	5.29						x		
Furze Platt	AD122	EF	slightly rolled	20	p	0	5	b	1	5.18								
Furze Platt	AD126	FG	rolled	34	f	1	10	m	0	5.2						x	x	
Furze Platt	AD127	F	rolled	42	f	0	5	m	2	2.26								
Furze Platt	AD128	F	rolled	44	f	0	5	m	2	2.73								
Furze Platt	AD130	GH	slightly rolled	37	f	0	15	m	0	2.64							x	

Furze Platt	AD135	H	very fresh	36	p	1	15	b	0	6.57					
Furze Platt	AD136	GK	very fresh	43	f	0	10	a	0	2					
Furze Platt	AD138	G	very fresh	42	p	0	35	a	0	4.5					x
Furze Platt	AD139	FG	rolled	41	f	0	5	m	2	5.75			x		
Furze Platt	AD141	F	rolled	31	p	0	25	b	0	3.54					
Furze Platt	AD142	F	rolled	38	f	0	0	n	2	3.07	x				
Furze Platt	AD143	H	rolled	31	f	0	5	m	2	5.5					
Furze Platt	AD144	FG	very fresh	40	f	0	5	m	2	7.53			x		
Furze Platt	AD145	F	very fresh	28	p	0	5	b	2	4.59	x	x			
Furze Platt	AD146	F	slightly rolled	33	p	0	15	a	2	3.34		x			
Furze Platt	AD149	FG	rolled	36	f	0	0	n	2	2.39					
Furze Platt	AD15	G	rolled	55	f	0	0	n	2	2.37					
Furze Platt	AD152	F	rolled	28	p	0	10	b	1	2.68		x			
Furze Platt	AD153	DF	rolled	29	p	0	20	b	0	4.35				x	
Furze Platt	AD154	EF	slightly rolled	27	p	0	10	a	2	5.73					x
Furze Platt	AD155	FM	slightly rolled	23	p	0	20	b	0	5.95			x	x	x
Furze Platt	AD156	EF	rolled	29	p	0	25	a	2	3.21		x			
Furze Platt	AD161	E	rolled	29	f	0	5	m	2	2.9					
Furze Platt	AD168	FM	very fresh	54	p	0	5	b	2	1.95			x		x
Furze Platt	AD171	F	slightly rolled	43	p	0	15	b	0	4.02					
Furze Platt	AD172	H	very fresh	25	f	1	20	a	0	3.66					
Furze Platt	AD173	FM	slightly rolled	47	f	1	5	m	0	4			x		
Furze Platt	AD175	F	slightly rolled	26	u	0	30	a	0	3.38	x				

Furze Platt	AD176	F	slightly rolled	45	f	0	0	n	2	2.03					
Furze Platt	AD177	FM	very fresh	47	f	0	15	m	2	4.03	x	x		x	
Furze Platt	AD182	F	very fresh	36	p	1	10	b	2	4.61				x	
Furze Platt	AD183	F	slightly rolled	47	p	0	5	b	2	5.48				x	
Furze Platt	AD185	F	slightly rolled	45	f	0	5	m	2	3.41				x	
Furze Platt	AD189	GH	slightly rolled	33	p	1	20	b	0	4.53					
Furze Platt	AD19	DF	rolled	33	p	1	10	b	0	8.28					x
Furze Platt	AD190	G	rolled	38	p	0	10	a	0	6.3					x
Furze Platt	AD196	F	slightly rolled	35	f	0	5	m	0	2.58					
Furze Platt	AD199	G	rolled	26	u	0	50	a	0	4.14					x
Furze Platt	AD2	FG	rolled	26	p	0	10	b	2	2.82					
Furze Platt	AD204	G	rolled	39	f	0	20	a	0	5.03					
Furze Platt	AD205	F	rolled	42	p	0	5	b	0	2.36					
Furze Platt	AD21	HK	slightly rolled	31	p	0	15	a	0	3.12					x
Furze Platt	AD211	EF	rolled	29	f	0	10	m	2	7					x
Furze Platt	AD213	FM	very fresh	33	f	0	5	m	0	4.22				x	
Furze Platt	AD214	HK	rolled	25	p	0	5	a	2	2.84					
Furze Platt	AD215	E	very fresh	22	f	0	5	b	2	7.21					x
Furze Platt	AD216	F	very fresh	26	p	1	20	a	0	7.8	x				
Furze Platt	AD217	FM	very fresh	39	f	0	5	m	2	2.66		x	x		
Furze Platt	AD218	DF	slightly rolled	35	f	0	5	a	0	5.5	x				
Furze Platt	AD219	D	slightly rolled	23	p	0	10	a	1	3.33		x			
Furze Platt	AD220	D	rolled	22	f	0	10	m	0	5.09	x				

Furze Platt	AD221	F	very fresh	26	p	0	35	a	0	2.76							
Furze Platt	AD226	F	very fresh	42	p	0	10	b	0	3.48							
Furze Platt	AD227	DF	slightly rolled	26	f	0	10	m	2	5.81							
Furze Platt	AD231	M	rolled	35	u	0	40	b	0	3.21			x				x
Furze Platt	AD235	D	rolled	27	p	0	15	b	2	3.13							x
Furze Platt	AD237	D	slightly rolled	44	p	0	5	b	2	6.22						x	
Furze Platt	AD238	F	slightly rolled	33	f	0	5	m	0	2.29							
Furze Platt	AD241	F	slightly rolled	42	p	0	10	b	2	2.44	x	x					x
Furze Platt	AD244	F	slightly rolled	44	p	0	10	b	0	4.05							
Furze Platt	AD245	F	rolled	20	p	0	30	a	1	2.29							
Furze Platt	AD247	F	rolled	34	f	0	0	n	2	5.02							
Furze Platt	AD251	D	rolled	25	p	0	10	b	2	4.28						x	
Furze Platt	AD255	D	rolled	28	p	0	10	b	0	7.08							
Furze Platt	AD258	E	very rolled	28	f	0	0	n	2	8.1							
Furze Platt	AD261	FM	slightly rolled	36	f	0	5	m	2	3.16				x			
Furze Platt	AD262	E	rolled	22	f	0	0	n	2	4.15							
Furze Platt	AD264	F	very fresh	38	f	0	10	m	2	4.93		x					
Furze Platt	AD269	F	slightly rolled	43	p	0	15	a	2	3.66		x					
Furze Platt	AD272	FG	rolled	47	p	0	15	a	0	2.32	x						
Furze Platt	AD277	F	very rolled	27	p	0	30	b	2	2.5		x					
Furze Platt	AD280	DF	slightly rolled	33	p	0	15	a	0	6.53			x				
Furze Platt	AD287	J	very fresh	27	f	0	35	a	0	5.26					x		
Furze Platt	AD291	DF	slightly rolled	26	u	0	10	a	0	7.72							

Furze Platt	AD3	FG	slightly rolled	31	p	0	15	a	2	3.15							
Furze Platt	AD30	HK	rolled	32	p	0	15	b	2	3.47							
Furze Platt	AD302	L	slightly rolled	46	f	0	5	m	2	8.12	x						x
Furze Platt	AD304	FM	very fresh	49	f	0	15	m	0	3.18			x		x		
Furze Platt	AD307	D	slightly rolled	21	u	0	45	a	0	4.57			x		x		
Furze Platt	AD309	F	slightly rolled	32	p	0	25	a	0	3.32							
Furze Platt	AD31	F	slightly rolled	19	p	0	25	a	0	5.3							
Furze Platt	AD310	F	rolled	39	f	0	5	m	2	4.68						x	
Furze Platt	AD314	DK	rolled	31	p	0	55	a	0	4.43							
Furze Platt	AD32	F	rolled	29	u	0	35	b	0	4.02							
Furze Platt	AD320	GJ	rolled	34	f	0	0	n	2	2.5			x				
Furze Platt	AD323	EF	slightly rolled	35	f	0	20	m	0	5.5							x
Furze Platt	AD328	F	slightly rolled	36	f	0	50	m	0	10.62	x			x			
Furze Platt	AD329	F	slightly rolled	31	f	0	10	m	0	2.29							
Furze Platt	AD33	J	slightly rolled	22	f	1	0	n	1	4.07							x
Furze Platt	AD331	E	rolled	29	p	0	5	b	0	3.28							
Furze Platt	AD339	F	slightly rolled	58	f	0	5	a	0	3.22		x					
Furze Platt	AD34	G	slightly rolled	29	p	0	15	a	0	9.24							
Furze Platt	AD342	F	very rolled	34	p	0	10	a	0	6.41							x
Furze Platt	AD343	FG	very rolled	37	f	0	10	m	2	2.17		x					
Furze Platt	AD344	F	slightly rolled	60	p	0	15	a	0	5.57						x	
Furze Platt	AD346	DF	very rolled	33	f	0	10	m	2	5.03	x						
Furze Platt	AD347	F	slightly rolled	34	p	0	5	a	0	6.43							

Furze Platt	AD348	DF	rolled	37	f	0	5	m	2	3.26				x			
Furze Platt	AD349	D	rolled	40	p	0	15	a	2	4.58				x			
Furze Platt	AD350	F	rolled	27	p	0	10	b	2	3.3		x					
Furze Platt	AD353	H	rolled	43	p	0	10	a	0	3.91						x	
Furze Platt	AD356	HK	slightly rolled	40	f	0	5	m	2	3.95							
Furze Platt	AD358	G	rolled	27	u	0	25	b	0	4.99							
Furze Platt	AD361	HK	rolled	41	p	0	5	b	2	4.22							
Furze Platt	AD365	D	very fresh	29	u	0	50	a	0	5.22				x			
Furze Platt	AD369	E	slightly rolled	35	p	0	30	a	0	5.68							
Furze Platt	AD371	K	slightly rolled	26	f	0	15	m	0	5.93					x		
Furze Platt	AD373	FM	slightly rolled	35	f	0	0	n	2	3.8		x	x				
Furze Platt	AD374	FG	slightly rolled	50	p	0	10	a	0	3.19				x			
Furze Platt	AD375	FG	rolled	49	p	0	5	b	0	6.73							
Furze Platt	AD376	G	rolled	40	p	0	10	a	2	3.72	x					x	
Furze Platt	AD378	F	slightly rolled	51	p	0	5	a	2	7.87		x					
Furze Platt	AD379	F	very rolled	32	p	0	15	a	0	5.51			x		x		
Furze Platt	AD38	F	slightly rolled	32	u	0	20	b	0	4.77	x	x		x			
Furze Platt	AD380	G	very rolled	28	p	0	5	b	2	3.45							
Furze Platt	AD381	G	slightly rolled	35	f	0	5	m	2	3.76							
Furze Platt	AD382	F	rolled	49	p	0	10	a	0	3.1				x			
Furze Platt	AD384	G	rolled	34	f	0	0	n	2	5.04	x			x			
Furze Platt	AD387	F	very fresh	39	f	0	5	m	2	3.26							
Furze Platt	AD388	DF	rolled	24	f	0	0	n	2	3.14							

Furze Platt	AD389	FG	slightly rolled	22	p	0	15	a	0	4.08					
Furze Platt	AD390	G	very fresh	33	p	0	5	b	2	6.41			x		
Furze Platt	AD391	F	rolled	32	p	0	15	a	2	5.34					
Furze Platt	AD392	F	slightly rolled	34	f	0	5	m	2	3.34					
Furze Platt	AD393	F	rolled	39	f	0	0	n	2	8.82			x		
Furze Platt	AD394	F	slightly rolled	40	f	0	15	m	2	7.44		x	x		
Furze Platt	AD395	DF	slightly rolled	22	p	0	5	a	2	4.43					
Furze Platt	AD398	F	slightly rolled	27	f	1	15	m	2	3.12					x
Furze Platt	AD399	H	rolled	27	f	1	0	n	2	3.67					
Furze Platt	AD4	DF	slightly rolled	28	u	0	40	a	0	7.06			x	x	
Furze Platt	AD40	GH	rolled	68	f	0	15	m	2	7.3					
Furze Platt	AD401	DF	rolled	37	f	0	10	m	0	4.87					
Furze Platt	AD403	E	slightly rolled	21	p	0	15	b	2	6.79					
Furze Platt	AD404	EF	very fresh	26	p	0	10	b	2	2.87		x			
Furze Platt	AD405	DF	rolled	15	p	0	50	a	0	3				x	
Furze Platt	AD406	F	very fresh	34	p	0	15	a	0	8.85					
Furze Platt	AD408	E	slightly rolled	19	p	0	40	a	0	5.79					
Furze Platt	AD409	EF	rolled	31	f	0	5	m	2	7.08	x				
Furze Platt	AD410	FM	slightly rolled	24	p	0	15	b	2	2.7			x		
Furze Platt	AD411	FG	slightly rolled	20	p	1	5	b	2	2.71	x				
Furze Platt	AD412	E	slightly rolled	19	f	0	10	m	0	5.37					
Furze Platt	AD413	E	rolled	20	p	0	10	a	0	4.26	x				
Furze Platt	AD415	FG	slightly rolled	32	p	0	5	b	2	4.45		x			

Furze Platt	AD416	E	slightly rolled	28	p	1	5	a	0	6.17						
Furze Platt	AD417	EF	very rolled	22	p	0	5	b	2	5.35						
Furze Platt	AD418	E	rolled	22	u	0	20	b	0	3.28						
Furze Platt	AD42	FG	very fresh	46	p	0	5	b	0	3.58						
Furze Platt	AD422	H	slightly rolled	54	f	1	10	a	0	3.25						
Furze Platt	AD423	F	slightly rolled	53	f	0	0	n	2	3.18						
Furze Platt	AD424	F	rolled	35	p	0	5	b	2	9.03					x	x
Furze Platt	AD425	F	slightly rolled	46	f	0	25	a	0	5.11	x					x
Furze Platt	AD429	L	very fresh	39	f	1	20	m	0	3.28				x		
Furze Platt	AD43	GH	slightly rolled	39	f	0	10	m	0	7.14						
Furze Platt	AD432	F	very fresh	32	f	0	10	m	0	4.6			x	x		
Furze Platt	AD433	F	rolled	49	f	0	10	m	0	3.69						
Furze Platt	AD434	HK	slightly rolled	37	p	0	10	a	0	6.08					x	
Furze Platt	AD435	F	very fresh	49	f	0	5	m	2	3.21						
Furze Platt	AD436	F	slightly rolled	31	f	0	0	n	2	3.81						x
Furze Platt	AD437	FM	rolled	32	p	0	5	b	2	3.43		x				
Furze Platt	AD438	D	slightly rolled	29	f	0	20	m	2	4.44						
Furze Platt	AD44	F	rolled	58	f	0	5	m	2	2.88						
Furze Platt	AD442	GH	very fresh	29	p	0	20	a	0	2.97				x		
Furze Platt	AD443	FG	slightly rolled	31	u	0	45	b	0	4.72					x	
Furze Platt	AD447	GH	rolled	39	f	0	5	m	2	7.27						
Furze Platt	AD448	F	slightly rolled	42	p	0	15	b	0	4.11						
Furze Platt	AD449	F	very fresh	26	u	0	25	b	0	5.46						

Furze Platt	AD46	FG	slightly rolled	41	p	0	10	b	0	2.6							
Furze Platt	AD463	G	rolled	32	u	0	20	b	0	3.71							
Furze Platt	AD466	DF	slightly rolled	31	p	0	20	a	0	4.8				x			
Furze Platt	AD467	DK	rolled	29	p	0	45	b	0	3.71					x		
Furze Platt	AD470	K	very fresh	28	p	0	30	b	0	7.34							
Furze Platt	AD474	F	very fresh	26	p	0	10	b	0	4.48							
Furze Platt	AD487	F	slightly rolled	37	f	0	5	m	2	5.88	x						
Furze Platt	AD5	DF	rolled	34	f	0	50	m	0	7.05					x		
Furze Platt	AD50	GK	slightly rolled	45	f	0	20	m	2	2.57		x					
Furze Platt	AD509	D	slightly rolled	26	p	0	10	b	1	5.65	x						
Furze Platt	AD516	JK	slightly rolled	27	p	0	15	b	2	3.49							
Furze Platt	AD517	DF	rolled	22	f	0	15	m	1	4.23							
Furze Platt	AD52	F	very fresh	27	p	0	45	b	0	6.64					x		
Furze Platt	AD521	J	very fresh	35	f	1	0	n	2	2.82							
Furze Platt	AD53	F	very rolled	36	u	0	35	b	0	3.4							
Furze Platt	AD54	M	very fresh	52	p	0	5	b	2	2.78			x				
Furze Platt	AD56	HK	rolled	35	f	0	0	n	2	3.06							
Furze Platt	AD566	E	rolled	24	f	0	5	m	2	2.47							x
Furze Platt	AD567	F	rolled	25	f	0	0	n	1	4.61						x	
Furze Platt	AD57	EF	slightly rolled	34	p	0	25	a	0	5.92							
Furze Platt	AD576	F	slightly rolled	45	f	0	0	n	2	3.24							
Furze Platt	AD58	F	slightly rolled	43	p	0	15	b	0	4.55	x						
Furze Platt	AD584	F	very fresh	43	f	0	0	n	2	4.28							

Furze Platt	AD586	E	rolled	18	u	0	35	b	0	5.4								
Furze Platt	AD587	DF	rolled	29	u	0	45	b	0	7.2	x				x			
Furze Platt	AD59	F	slightly rolled	37	p	0	5	b	2	4.88								x
Furze Platt	AD592	FM	very rolled	41	p	0	15	b	0	4.16				x				x
Furze Platt	AD593	F	very fresh	49	f	0	5	m	2	3.35						x		
Furze Platt	AD594	D	slightly rolled	34	f	0	20	a	0	6.19				x				x
Furze Platt	AD596	F	slightly rolled	42	f	0	30	m	2	6.23		x						
Furze Platt	AD6	DF	rolled	20	u	0	60	b	0	10.41	x			x	x			
Furze Platt	AD600	F	slightly rolled	36	f	0	15	m	2	4.54								
Furze Platt	AD601	DF	slightly rolled	26	p	0	40	a	2	2.89								
Furze Platt	AD61	JK	slightly rolled	26	f	0	5	m	1	3.04								
Furze Platt	AD619	F	very fresh	35	p	0	20	a	0	3.54								
Furze Platt	AD628	EF	slightly rolled	20	f	0	35	a	0	3.58								
Furze Platt	AD63	F	very fresh	35	p	0	10	a	2	7.06							x	
Furze Platt	AD632	FM	very fresh	47	p	0	20	a	0	3.33			x					x
Furze Platt	AD639	F	very fresh	36	p	1	15	a	0								x	
Furze Platt	AD64	F	slightly rolled	43	u	0	15	b	0	2.52								
Furze Platt	AD640	F	very fresh	43	p	0	5	b	2								x	
Furze Platt	AD642	F	rolled	37	p	0	15	a	0									x
Furze Platt	AD644	GK	very fresh	44	f	0	10	m	2								x	
Furze Platt	AD647	G	rolled	39	p	0	25	a	0									
Furze Platt	AD649	F	slightly rolled	47	p	0	5	a	0									
Furze Platt	AD651	FG	very fresh	46	f	0	0	n	2									

Furze Platt	AD654	F	slightly rolled	40	p	0	10	a	2									
Furze Platt	AD655	F	rolled	48	p	0	10	b	2			x						
Furze Platt	AD656	M	very fresh	49	p	0	5	b	0	2.12			x					
Furze Platt	AD657	FG	slightly rolled	42	p	0	15	b	0	2.46								
Furze Platt	AD66	F	slightly rolled	32	p	0	10	a	0	3.15	x							
Furze Platt	AD660	F	slightly rolled	34	f	0	5	m	1	2.8								
Furze Platt	AD661	G	slightly rolled	32	p	0	5	a	2	2.29								
Furze Platt	AD663	EF	rolled	32	f	0	20	m	0	4.76								
Furze Platt	AD667	GH	slightly rolled	44	f	0	0	n	2	3.84							x	
Furze Platt	AD668	M	slightly rolled	48	f	0	10	m	0	3.74			x					x
Furze Platt	AD670	FM	slightly rolled	40	f	0	70	m	0	2.91				x				
Furze Platt	AD671	FG	very fresh	51	f	1	15	a	0	5.16								
Furze Platt	AD672	G	rolled	35	p	0	10	b	2	5.4								
Furze Platt	AD679	M	very fresh	56	f	0	0	n	2	5.63			x			x		
Furze Platt	AD680	H	very fresh	33	f	1	10	m	2	1.83								
Furze Platt	AD682	F	slightly rolled	37	f	0	0	n	2	3.65						x		
Furze Platt	AD683	F	rolled	55	f	0	5	m	0	2.39								
Furze Platt	AD685	F	very fresh	35	p	0	20	b	0	2.45							x	
Furze Platt	AD686	F	slightly rolled	33	p	0	15	b	0	4.99								
Furze Platt	AD687	H	very fresh	21	f	1	25	m	0	4.76					x			
Furze Platt	AD689	DF	rolled	21	p	0	45	m	0	6.25	x							
Furze Platt	AD693	GJ	slightly rolled	29	p	0	10	b	0	3.79								
Furze Platt	AD697	F	slightly rolled	26	u	0	15	a	0	2.63								

Furze Platt	AD698	EF	slightly rolled	31	p	0	10	b	2	3.03			x			
Furze Platt	AD7	E	very fresh	32	p	0	10	b	2	6.83			x			x
Furze Platt	AD700	E	slightly rolled	17	p	0	5	b	2	3.58						
Furze Platt	AD701	K	very fresh	30	p	1	5	b	2	5.61						
Furze Platt	AD702	F	rolled	57	f	0	5	m	0	1.99						
Furze Platt	AD703	F	very fresh	61	p	0	10	b	2	3.17						
Furze Platt	AD704	FM	slightly rolled	63	f	0	10	m	2	3.88			x			
Furze Platt	AD705	FM	very fresh	50	f	0	10	m	2	1.52		x				
Furze Platt	AD707	FM	very fresh	56	p	0	20	b	2	2.03		x				
Furze Platt	AD708	M	slightly rolled	61	f	0	25	a	0	2.12		x				
Furze Platt	AD709	M	slightly rolled	64	p	1	10	a	0	2.98		x				
Furze Platt	AD71	F	slightly rolled	34	p	0	10	a	0	3.63						
Furze Platt	AD710	F	very fresh	53	p	0	10	b	2	2.59						
Furze Platt	AD711	FM	very fresh	44	p	0	15	a	0	4.07		x				
Furze Platt	AD712	FM	slightly rolled	46	p	0	5	b	2	5.42		x			x	
Furze Platt	AD713	FM	very fresh	46	p	0	5	b	2	1.95			x			
Furze Platt	AD714	FM	slightly rolled	37	p	0	10	a	0	3.87		x				
Furze Platt	AD715	F	very fresh	54	p	0	10	b	2	2.36						
Furze Platt	AD716	F	very fresh	49	f	0	5	m	2	3.99						
Furze Platt	AD753	E	rolled	30	p	0	30	a	0	3.55				x		
Furze Platt	AD755	F	slightly rolled	41	p	0	5	b	2	2.93	x				x	
Furze Platt	AD757	GJ	rolled	31	u	0	20	b	0	4.4						
Furze Platt	AD760	D	rolled	26	u	0	40	a	0	2.82						

Furze Platt	AD761	D	rolled	34	p	0	10	b	0	2.97			x			
Furze Platt	AD767	F	slightly rolled	35	p	0	10	b	0	1.47						
Furze Platt	AD772	DF	slightly rolled	38	u	0	25	b	0	4.43					x	x
Furze Platt	AD776	FM	slightly rolled	49	u	0	15	b	0	4.94			x			
Furze Platt	AD778	DG	rolled	54	p	0	35	b	0	4.57		x				
Furze Platt	AD779	F	very fresh	51	f	0	5	m	2	3.14						
Furze Platt	AD780	F	slightly rolled	33	u	0	45	b	0	4.51				x		
Furze Platt	AD781	F	very fresh	31	f	0	5	m	0	3.09						
Furze Platt	AD783	D	rolled	44	f	0	5	m	2	5.3			x			x
Furze Platt	AD79	E	very rolled	25	f	0	5	m	2	4.24						
Furze Platt	AD793	G	slightly rolled	52	p	0	15	a	0	4.02						
Furze Platt	AD796	F	slightly rolled	51	f	0	5	m	0	2.96			x			
Furze Platt	AD799	FM	slightly rolled	54	p	0	10	b	2	3.04						
Furze Platt	AD8	G	slightly rolled	22	u	0	25	b	0	4.57						
Furze Platt	AD800	F	very fresh	56	p	0	5	b	0	2.66						
Furze Platt	AD802	F	slightly rolled	47	f	0	10	m	2	1.77						
Furze Platt	AD805	F	rolled	36	p	0	10	b	0	3.29						
Furze Platt	AD808	D	slightly rolled	20	u	0	60	a	0							
Furze Platt	AD809	F	very fresh	45	p	0	5	b	0	2.15						
Furze Platt	AD809	K	rolled	36	f	0	0	n	2							
Furze Platt	AD81	F	slightly rolled	29	f	0	10	m	2	3.8	x					
Furze Platt	AD810	H	very fresh	36	p	1	15	a	0							
Furze Platt	AD811	FM	slightly rolled	31	f	0	0	n	2	4.09		x				

Furze Platt	AD813	FG	slightly rolled	32	f	0	10	m	2						
Furze Platt	AD814	FM	slightly rolled	62	f	0	5	m	2	3.43					x
Furze Platt	AD815	D	rolled	38	p	0	30	a	0	3.19		x			
Furze Platt	AD816	DF	very fresh	55	f	0	5	m	2	4.51					
Furze Platt	AD820	DF	rolled	25	p	0	35	a	0						
Furze Platt	AD822	DK	slightly rolled	46	f	0	0	n	2						
Furze Platt	AD824	D	very fresh	23	u	1	10	b	2						
Furze Platt	AD825	D	slightly rolled	32	f	0	0	n	2						
Furze Platt	AD826	DF	slightly rolled	22	p	0	30	a	1						
Furze Platt	AD827	DK	slightly rolled	26	p	0	15	a	0						
Furze Platt	AD828	E	rolled	29	p	0	10	b	2						
Furze Platt	AD829	F	rolled	28	p	0	30	b	0						
Furze Platt	AD832	HK	slightly rolled	26	u	0	25	b	0						
Furze Platt	AD833	DF	rolled	31	p	0	40	a	0						
Furze Platt	AD834	G	rolled	30	p	0	15	a	2	4.08	x			x	
Furze Platt	AD834	DF	slightly rolled	21	f	0	0	n	2	4.08					x
Furze Platt	AD835	HK	slightly rolled	38	f	1	10	m	0						
Furze Platt	AD836	H	slightly rolled	27	p	1	15	a	0						
Furze Platt	AD837	D	rolled	51	p	0	25	b	2						
Furze Platt	AD838	G	slightly rolled	26	u	0	25	b	0						
Furze Platt	AD839	D	rolled	17	p	1	15	b	2						
Furze Platt	AD84	GK	rolled	29	f	0	15	m	0	5.75			x		
Furze Platt	AD840	DF	rolled	21	p	0	30	b	0						

Furze Platt	AD841	H	slightly rolled	29	p	1	35	a	0				
Furze Platt	AD843	F	slightly rolled	35	p	0	25	a	2				
Furze Platt	AD844	DF	slightly rolled	28	f	0	0	n	2	5.14	x		
Furze Platt	AD844	DK	rolled	25	p	0	25	b	2	5.14		x	
Furze Platt	AD845	DF	slightly rolled	34	f	0	10	a	2	6.89		x	
Furze Platt	AD849	D	rolled	35	f	1	5	m	2				
Furze Platt	AD850	K	very rolled	21	p	1	5	b	2				
Furze Platt	AD851	DF	rolled	29	f	0	5	m	0				
Furze Platt	AD852	E	very fresh	17	p	1	30	b	0				
Furze Platt	AD854	F	slightly rolled	36	p	0	10	a	2	3.09			
Furze Platt	AD854	D	slightly rolled	34	f	0	10	m	2				
Furze Platt	AD855	EF	rolled	26	f	0	5	m	2				
Furze Platt	AD857	DK	rolled	49	f	1	10	m	2	5.71			
Furze Platt	AD858	DK	very rolled	39	f	0	20	a	0	2.64			x
Furze Platt	AD86	DF	rolled	22	p	0	20	a	0	9.92			
Furze Platt	AD860	F	slightly rolled	37	p	1	20	b	0	4.1			
Furze Platt	AD861	D	rolled	26	f	0	5	m	2	3.84			
Furze Platt	AD862	H	rolled	29	u	0	30	a	0	4.29			
Furze Platt	AD862	H	slightly rolled	33	p	1	20	a	2	4.29			
Furze Platt	AD864	G	rolled	24	p	0	15	b	2	4.34			
Furze Platt	AD864	DK	rolled	39	p	0	20	a	0	4.34			
Furze Platt	AD867	F	slightly rolled	43	f	0	0	n	2	4.54			
Furze Platt	AD868	F	slightly rolled	39	f	1	5	m	2	2.7			

Furze Platt	AD870	F	rolled	37	p	0	5	b	2	2.93						
Furze Platt	AD871	HK	rolled	25	p	1	10	b	2	4.61					x	
Furze Platt	AD872	E	rolled	25	p	0	35	a	0	5.35						
Furze Platt	AD874	DF	rolled	23	p	0	10	b	2	3.19						
Furze Platt	AD875	GK	very fresh	35	p	0	20	b	2	5.72						x
Furze Platt	AD876	D	rolled	20	u	0	55	b	0	5.72					x	
Furze Platt	AD877	DF	slightly rolled	24	f	0	0	n	2	3.06						
Furze Platt	AD878	J	very fresh	40	p	0	20	b	0	4.08						
Furze Platt	AD879	F	rolled	41	p	0	25	a	1	7.93						
Furze Platt	AD880	D	slightly rolled	36	f	0	40	m	0	5.67						
Furze Platt	AD881	DF	very fresh	26	p	0	5	a	2	6.13	x	x				
Furze Platt	AD881	D	slightly rolled	26	p	0	15	a	0	6.13	x					
Furze Platt	AD882	G	slightly rolled	32	f	0	5	m	2	2.59						
Furze Platt	AD883	DF	rolled	31	f	0	30	m	0	5.37			x			
Furze Platt	AD884	FG	slightly rolled	36	p	0	5	n	2	4.34						x
Furze Platt	AD885	DF	slightly rolled	30	p	0	15	b	2	3.37						
Furze Platt	AD886	D	rolled	35	p	0	5	b	2	4.32						
Furze Platt	AD886	H	rolled	32	f	0	20	m	0	4.32						
Furze Platt	AD887	GK	slightly rolled	34	p	1	10	a	0	3.42						
Furze Platt	AD89	H	very fresh	27	u	1	35	b	0	3.41						
Furze Platt	AD893	E	rolled	32	f	0	10	m	2	5.53						
Furze Platt	AD9	E	slightly rolled	35	p	0	20	b	2	4.66		x		x		
Furze Platt	AD91	DK	rolled	31	f	0	5	m	0	4.45						

Furze Platt	AD92	E	rolled	18	p	0	10	b	1	4.43
Furze Platt	AD93	K	rolled	26	f	0	0	n	1	3.6
Furze Platt	AD94	F	rolled	27	u	0	20	b	0	4.48

Site	Museum	Collection	Location reference.	Type	Condition	L (mm)	B (mm)	T (mm)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Ham Hill	BM	Wellcome	1F27/10.1	F	slightly rolled	120	69	42	32	28	59	9	42	0.61	0.58	0.27	P	0.47	0.21
Ham Hill	BM	Wellcome	1F27/10.2	F	slightly rolled	120	71	40	30	32	67	13	36	0.56	0.59	0.25	p	0.48	0.36
Ham Hill	BM	IOA	1F27/9	H	slightly rolled	191	104	45	108	90	86	22	37	0.43	0.54	0.57	c	1.05	0.59
Ham Hill	BM	Harrison	1F27/8	HK	rolled	94	67	35	30	50	63	21	26	0.52	0.71	0.32	p	0.79	0.81
Ham Hill	BM	Burchell	1F27/7.1	F	very fresh	143	92	27	33	43	91	12	22	0.29	0.64	0.23	p	0.47	0.55
Ham Hill	BM	Burchell	1F27/7.2	H	rolled	137	81	47	87	75	59	16	24	0.58	0.59	0.64	c	1.27	0.67
Ham Hill	BM	Burchell	1F27/6.1	J	very rolled	74	60	18	33	36	53	11	16	0.30	0.81	0.45	o	0.68	0.69
Ham Hill	BM	Burchell	1F27/6.2	K	very rolled	72	61	33	37	50	55	20	23	0.54	0.85	0.51	o	0.91	0.87
Ham Hill	BM	Burchell	1F27/6.3	GH	rolled	113	76	43	53	59	61	14	36	0.57	0.67	0.47	o	0.97	0.39
Ham Hill	BM	Burchell	1F27/6.4	EF	slightly rolled	75	50	28	22	20	48	12	24	0.56	0.67	0.29	p	0.42	0.50
Ham Hill	BM	Burchell	1F27/6.5	K	rolled	84	62	25	34	45	55	14	17	0.40	0.74	0.40	o	0.82	0.82
Ham Hill	BM	Burchell	1F27/6.6	F	slightly rolled	117	57	35	28	26	55	11	31	0.61	0.49	0.24	p	0.47	0.35
Ham Hill	BM	Burchell	1F27/6.7	K	rolled	136	81	36	56	65	69	18	23	0.44	0.60	0.41	o	0.94	0.78
Ham Hill	BM	Burchell	1F27/5.1	F	rolled	160	86	49	32	43	86	19	49	0.57	0.54	0.20	p	0.50	0.39
Ham Hill	BM	Burchell	1F27/5.2	F	slightly rolled	164	73	37	54	34	69	14	35	0.51	0.45	0.33	p	0.49	0.40
Ham Hill	BM	Burchell	1F27/5.3	FG	rolled	181	103	45	77	56	87	18	42	0.44	0.57	0.43	o	0.64	0.43
Ham Hill	BM	Burchell	1F27/5.4	FM	rolled	172	93	44	36	42	92	16	41	0.47	0.54	0.21	p	0.46	0.39
Ham Hill	BM	Burchell	1F27/4.1	FG	slightly rolled	212	113	53	70	67	101	19	41	0.47	0.53	0.33	p	0.66	0.46
Ham Hill	BM	Burchell	1F27/4.2	F	slightly rolled	168	53	51	13	52	93	15	42	0.96	0.32	0.08	p	0.56	0.36

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Hillingdon, L.B.	Sabey's New Pit	BM	Garroway Rice	1L22/19.1	228	114	89	48		65	64	113	17	48	0.42	0.50	0.29	p	0.57	0.35
Hillingdon, L.B.	Yiewsley, Western Cart-age cos Pit	BM	Garroway Rice	1L22/20.1	158	100	96	33		51	65	92	19	24	0.33	0.63	0.32	p	0.71	0.79
Hillingdon, L.B.	Yiewsley, Clayton's Pit	BM	Garroway Rice	1L22/20.2	199	99	98	53		85	72	95	22	43	0.54	0.50	0.43	o	0.76	0.51
Hillingdon, L.B.	Yiewsley	BM	Garroway Rice	1L22/21.1	129	87	84	37		58	64	77	16	35	0.43	0.67	0.45	o	0.83	0.46
Hillingdon, L.B.	Yiewsley, Boyer's Pit	BM	Garroway Rice	1L22/21.2	145	112	111	40		69	102	94	18	36	0.36	0.77	0.48	o	1.09	0.50
Hillingdon, L.B.		BM	Garroway Rice	1L22/21.3	100	77	71	22		28	58	73	17	16	0.29	0.77	0.28	p	0.79	1.06
Hillingdon, L.B.	Yiewsley, Boyer's Pit	BM	Garroway Rice	1L22/22.1	145	95	90	43		85	82	77	12	39	0.45	0.66	0.59	c	1.06	0.31
Hillingdon, L.B.	Illegible	BM	Garroway Rice	1L22/22.2	223	119	116	53		96	105	111	37	35	0.45	0.53	0.43	o	0.95	1.06
Hillingdon, L.B.	Yiewsley, Middlesex	BM	Garroway Rice	1L22/23.1	141	76	66	44		27	40	74	18	40	0.58	0.54	0.19	p	0.54	0.45
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	Garroway Rice	1L22/23.2	156	101	97	46		94	94	71	20	34	0.46	0.65	0.60	c	1.32	0.59
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	Garroway Rice	1L22/23.3	90	75	70	25		21	43	69	16	19	0.33	0.83	0.23	p	0.62	0.84
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	Garroway Rice	1L22/23.4	138	96	96	37		64	74	92	21	33	0.39	0.70	0.46	o	0.80	0.64
Hillingdon, L.B.	Yiewsley, Middlesex	BM	Garroway Rice	1L22/24.1	124	57	42	37		22	23	55	12	36	0.65	0.46	0.18	p	0.42	0.33
Hillingdon, L.B.	Yiewsley	BM	IOA	1L22/27.1	114	84	76	34		28	55	73	28	26	0.40	0.74	0.25	p	0.75	1.08
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	IOA	1L22/27.2	70	53	52	23		22	27	51	10	17	0.43	0.76	0.31	p	0.53	0.59
Hillingdon, L.B.	Yiewsley	BM	IOA	1L22/27.3	180	93	83	48		62	49	84	19	37	0.52	0.52	0.34	p	0.58	0.51
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	IOA	1L22/27.4	109	60	51	37		6	31	58	13	30	0.62	0.55	0.06	p	0.53	0.43
Hillingdon, L.B.	Yiewsley	BM	IOA	1L22/27.5	104	70	66	31		38	45	60	15	26	0.44	0.67	0.37	o	0.75	0.58
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	IOA ex Garroway Rice	1L23/1.1	123	70	68	42		35	45	61	17	32	0.60	0.57	0.28	p	0.74	0.53

Hillingdon, L.B.		BM	IOA ex Garroway Rice	1L23/1.2	124	78	69	54		45	53	71	17	49	0.69	0.63	0.36	o	0.75	0.35
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	IOA ex Garroway Rice	1L23/1.3	151	86	85	39		63	53	68	24	31	0.45	0.57	0.42	o	0.78	0.77
Hillingdon, L.B.		BM	IOA ex Garroway Rice	1L23/1.4	159	93	84	46		62	63	84	18	40	0.49	0.58	0.39	o	0.75	0.45
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	IOA ex Garroway Rice	1L23/1.5	107	68	54	41		20	35	67	17	36	0.60	0.64	0.19	p	0.52	0.47
Hillingdon, L.B.	Yiewsley, Clayton's Pit	BM	IOA ex Garroway Rice	1L23/10.1	98	63	59	27		37	34	61	13	23	0.43	0.64	0.38	o	0.56	0.57
Hillingdon, L.B.	Yiewsley, Clayton's Pit	BM	IOA ex Garroway Rice	1L23/10.2	112	75	71	28		24	56	64	15	25	0.37	0.67	0.21	p	0.88	0.60
Hillingdon, L.B.	Yiewsley, Maynard's Pit	BM	IOA ex Garroway Rice	1L23/12.1	104	50	33	37		21	22	49	11	33	0.74	0.48	0.20	p	0.45	0.33
Hillingdon, L.B.	Yiewsley, Maynard's Pit	BM	IOA ex Garroway Rice	1L23/12.2	74	51	44	23		14	22	50	10	18	0.45	0.69	0.19	p	0.44	0.56
Hillingdon, L.B.	Yiewsley, Maynard's Pit	BM	IOA ex Garroway Rice	1L23/12.3	129	77	70	39		39	41	69	14	35	0.51	0.60	0.30	p	0.59	0.40
Hillingdon, L.B.	West Drayton, Maynard's Pit	BM	IOA ex Garroway Rice	1L23/12.4	102	68	64	29		40	43	57	10	23	0.43	0.67	0.39	o	0.75	0.43
Hillingdon, L.B.	Yiewsley, Maynard's Pit	BM	IOA ex Garroway Rice	1L23/12.5	128	83	62	42		29	32	80	16	33	0.51	0.65	0.23	p	0.40	0.48
Hillingdon, L.B.	Yiewsley, Middlesex	BM	IOA ex Garroway Rice	1L23/13.1	132	76	65	38		28	37	71	12	32	0.50	0.58	0.21	p	0.52	0.38
Hillingdon, L.B.	Yiewsley, Middlesex	BM	IOA ex Garroway Rice	1L23/13.2	110	59	56	32		39	31	46	10	28	0.54	0.54	0.35	o	0.67	0.36
Hillingdon, L.B.	Yiewsley, Middlesex	BM	IOA ex Garroway Rice	1L23/13.3	107	64	61	34		47	45	47	10	29	0.53	0.60	0.44	o	0.96	0.34
Hillingdon, L.B.		BM	IOA ex Garroway Rice	1L23/13.4	154	96	88	44		44	55	81	19	38	0.46	0.62	0.29	p	0.68	0.50

Hillingdon, L.B.	Yiewsley, Middlesex	BM	IOA ex Garroway Rice	1L23/13.5	162	84	59	45		42	33	77	14	34	0.54	0.52	0.26	p	0.43	0.41
Hillingdon, L.B.		BM	IOA ex Garroway Rice	1L23/15.1	113	93	85	37		23	49	93	20	35	0.40	0.82	0.20	p	0.53	0.57
Hillingdon, L.B.		BM	IOA	1L23/16.1	144	85	71	45		29	48	80	16	46	0.53	0.59	0.20	p	0.60	0.35
Hillingdon, L.B.	Yiewsley, Middlesex	BM	IOA	1L23/16.2	130	78	76	28		42	57	64	18	27	0.36	0.60	0.32	p	0.89	0.67
Hillingdon, L.B.		BM	IOA	1L23/16.3	78	67	61	28		30	32	63	12	25	0.42	0.86	0.38	o	0.51	0.48
Hillingdon, L.B.	Yiewsley	BM	IOA	1L23/16.4	104	64	49	28		26	29	60	11	24	0.44	0.62	0.25	p	0.48	0.46
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	IOA ex Garroway Rice	1L23/2.1	133	85	75	34		48	49	72	16	35	0.40	0.64	0.36	o	0.68	0.46
Hillingdon, L.B.	Yiewsley, Middlesex	BM	IOA ex Garroway Rice	1L23/2.2	96	63	47	29		23	29	60	7	26	0.46	0.66	0.24	p	0.48	0.27
Hillingdon, L.B.	Yiewsley, Middlesex	BM	IOA ex Garroway Rice	1L23/2.3	112	66	61	48		25	36	59	9	37	0.73	0.59	0.22	p	0.61	0.24
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	IOA ex Garroway Rice	1L23/2.4	100	58	53	31		31	29	50	9	21	0.53	0.58	0.31	p	0.58	0.43
Hillingdon, L.B.	Yiewsley, Middlesex	BM	IOA ex Garroway Rice	1L23/2.5	114	61	53	29		36	32	51	11	28	0.48	0.54	0.32	p	0.63	0.39
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	IOA ex Garroway Rice	1L23/2.6	153	100	81	41		25	47	98	23	39	0.41	0.65	0.16	p	0.48	0.59
Hillingdon, L.B.	Yiewsley, Eastwood's Pit	BM	IOA ex Garroway Rice	1L23/2.7	98	62	58	29		37	41	55	13	24	0.47	0.63	0.38	o	0.75	0.54
Hillingdon, L.B.		BM	IOA ex Garroway Rice	1L23/2.8	85	71	65	28		15	45	69	14	22	0.39	0.84	0.18	p	0.65	0.64
Hillingdon, L.B.	West Drayton	BM	Marsden	1L23/21.1	112	60	54	27		34	33	57	9	18	0.45	0.54	0.30	p	0.58	0.50
Hillingdon, L.B.		BM	Marsden	1L23/22.1	118	86	79	43		33	54	69	20	39	0.50	0.73	0.28	p	0.78	0.51
Hillingdon, L.B.		BM	Marsden	1L23/22.2	96	56	50	30		28	29	52	12	26	0.54	0.58	0.29	p	0.56	0.46
Hillingdon, L.B.		BM	Marsden	1L23/22/3	79	66	61	29		27	29	62	15	25	0.44	0.84	0.34	p	0.47	0.60

Hillingdon, L.B.	West Drayton	BM	Stockley	1L23/23.1	198	91	85	41		68	53	87	18	41	0.45	0.46	0.34	p	0.61	0.44
Hillingdon, L.B.	GW West Drayton	BM	S.H. Warren	1L23/24.1	150	86	80	40		29	56	83	30	33	0.47	0.57	0.19	p	0.67	0.91
Hillingdon, L.B.	West Drayton	BM	S.H. Warren	1L23/24.2	106	72	69	36		27	42	65	17	29	0.50	0.68	0.25	p	0.65	0.59
Hillingdon, L.B.	West Drayton	BM	Wellcome ex Marsden	1L23/25.1	87	50	48	48		41	31	37	16	31	0.96	0.57	0.47	o	0.84	0.52
Hillingdon, L.B.	West Drayton	BM	Wellcome ex Marsden	1L23/25.2	113	58	54	43		18	33	57	19	37	0.74	0.51	0.16	p	0.58	0.51
Hillingdon, L.B.	West Drayton	BM	Wellcome ex Marsden	1L23/25.3	120	60	57	28		51	37	49	11	24	0.47	0.50	0.43	o	0.76	0.46
Hillingdon, L.B.	West Drayton	BM	Wellcome ex Marsden	1L23/25.4	108	59	47	33		31	30	52	18	31	0.56	0.55	0.29	p	0.58	0.58
Hillingdon, L.B.	West Drayton	BM	Wellcome ex Marsden	1L23/25.5	93	50	45	22		29	26	42	8	13	0.44	0.54	0.31	p	0.62	0.62
Hillingdon, L.B.	Yiewsley, Boyer's Pit	BM	IOA ex Garroway Rice	1L23/7.1	94	52	38	25		15	20	51	10	22	0.48	0.55	0.16	p	0.39	0.45
Hillingdon, L.B.		BM	IOA ex Garroway Rice	1L23/7.2	78	48	37	29		16	22	48	8	26	0.60	0.62	0.21	p	0.46	0.31
Hillingdon, L.B.		BM	IOA ex Garroway Rice	1L23/7.3	60	41	36	15		22	21	36	10	11	0.37	0.68	0.37	o	0.58	0.91
Hillingdon, L.B.		BM	IOA ex Garroway Rice	1L23/7.4	93	53	43	38		24	23	47	8	34	0.72	0.57	0.26	p	0.49	0.24
Hillingdon, L.B.	Yiewsley, Middlesex	BM	IOA ex Garroway Rice	1L23/7.5	113	53	48	37		38	30	47	12	30	0.70	0.47	0.34	p	0.64	0.40
Hillingdon, L.B.	Yiewsley, Boyer's Pit	BM	IOA ex Garroway Rice	1L23/7.6	99	60	52	28		29	32	58	9	26	0.47	0.61	0.29	p	0.55	0.35
Hillingdon, L.B.	Yiewsley	BM	IOA ex Garroway Rice	1L23/7.7	148	78	77	47		58	50	56	15	35	0.60	0.53	0.39	o	0.89	0.43
Hillingdon, L.B.	Yiewsley, Middlesex	BM	IOA ex Garroway Rice	1L23/7.8	119	68	66	31		43	36	52	16	27	0.46	0.57	0.36	o	0.69	0.59
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/10.1	136	77	70	40		40	44	59	14	28	0.52	0.57	0.29	p	0.75	0.50
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/10.2	94	67	49	35		19	30	67	20	31	0.52	0.71	0.20	p	0.45	0.65
Hillingdon, L.B.	Yiewsley	BM	Wellcome ex J. Hancock	1L24/10.3	127	59	55	42		24	33	58	18	36	0.71	0.46	0.19	p	0.57	0.50

Hillingdon, L.B.		BM	Wellcome ex J. Hancock	1L24/10.4	126	87	84	36		48	57	81	13	36	0.41	0.69	0.38	o	0.70	0.36
Hillingdon, L.B.	Yiewsley	BM	Wellcome ex J. Hancock	1L24/11.1	152	84	75	48		32	58	81	24	37	0.57	0.55	0.21	p	0.72	0.65
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/11.2	108	65	63	35		26	42	57	16	31	0.54	0.60	0.24	p	0.74	0.52
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/11.3	139	79	63	55		36	37	76	18	46	0.70	0.57	0.26	p	0.49	0.39
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/11.4	109	67	64	37		35	49	59	22	27	0.55	0.61	0.32	p	0.83	0.81
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/11.5	79	67	63	33		26	40	58	13	29	0.49	0.85	0.33	p	0.69	0.45
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/12.1	139	80	78	44		47	48	53	19	31	0.55	0.58	0.34	p	0.91	0.61
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/12.2	115	70	61	31		25	43	65	17	31	0.44	0.61	0.22	p	0.66	0.55
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/12.3	110	83	64	38		18	38	81	21	27	0.46	0.75	0.16	p	0.47	0.78
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/12.4	156	85	80	37		43	52	75	17	34	0.44	0.54	0.28	p	0.69	0.50
Hillingdon, L.B.	Yiewsley	BM	Wellcome ex J. Hancock	1L24/13.1	134	88	81	35		48	63	83	24	30	0.40	0.66	0.36	o	0.76	0.80
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/13.2	149	78	62	46		39	36	75	14	45	0.59	0.52	0.26	p	0.48	0.31
Hillingdon, L.B.	Yiewsley, Sabey's Pit	BM	Wellcome ex J. Hancock	1L24/13.3	116	97	89	35		62	80	72	28	26	0.36	0.84	0.53	o	1.11	1.08
Hillingdon, L.B.	West Drayton	BM	Wellcome	1L24/18.1	110	70	68	36		44	46	54	15	28	0.51	0.64	0.40	o	0.85	0.54
Hillingdon, L.B.	Yiewsley, Middlesex	BM	Wellcome ex L. Abbott	1L24/21.1	106	71	66	41		37	40	65	15	38	0.58	0.67	0.35	o	0.62	0.39
Hillingdon, L.B.	Yiewsley, Middlesex	BM	Wellcome ex L. Abbott	1L24/21.2	119	70	67	32		50	44	54	20	21	0.46	0.59	0.42	o	0.81	0.95
Hillingdon, L.B.	Yiewsley, Middlesex	BM	Wellcome ex L. Abbott	1L24/21.3	114	71	60	52		37	31	49	18	40	0.73	0.62	0.32	p	0.63	0.45
Hillingdon, L.B.	Yiewsley, Middlesex	BM	Wellcome ex L. Abbott	1L24/21.4	115	64	63	34		52	47	63	16	28	0.53	0.56	0.45	o	0.75	0.57
Hillingdon, L.B.	Yiewsley, Middlesex	BM	Wellcome ex L. Abbott	1L24/21.5	92	52	48	24		25	35	44	12	15	0.46	0.57	0.27	p	0.80	0.80
Hillingdon, L.B.	West Drayton	BM	Wellcome ex L. Abbott	1L24/22.1	75	63	47	24		15	27	63	9	23	0.38	0.84	0.20	p	0.43	0.39
Hillingdon, L.B.	West Drayton	BM	Wellcome ex L. Abbott	1L24/22.2	108	68	59	41		50	43	58	30	32	0.60	0.63	0.46	o	0.74	0.94
Hillingdon, L.B.	West Drayton	BM	Wellcome ex L. Abbott	1L24/22.3	122	70	65	33		51	43	50	18	23	0.47	0.57	0.42	o	0.86	0.78
Hillingdon, L.B.	West Drayton	BM	Wellcome ex L. Abbott	1L24/22.4	108	71	61	39		38	30	47	24	36	0.55	0.66	0.35	o	0.64	0.67

Hillingdon, L.B.		BM	Wellcome ex L. Abbott	1L24/22.5	131	86	81	43		57	67	56	25	34	0.50	0.66	0.44	o	1.20	0.74
Hillingdon, L.B.	West Drayton	BM	Wellcome ex L. Abbott	1L24/23.1	146	71	64	51		40	39	65	29	44	0.72	0.49	0.27	p	0.60	0.66
Hillingdon, L.B.	West Drayton	BM	Wellcome ex L. Abbott	1L24/23.2	158	74	60	47		33	51	74	29	45	0.64	0.47	0.21	p	0.69	0.64
Hillingdon, L.B.	West Drayton	BM	Wellcome	1L24/26.1	117	62	60	20		42	38	59	14	16	0.32	0.53	0.36	o	0.64	0.88
Hillingdon, L.B.	West Drayton	BM	Wellcome	1L24/26.2	87	60	57	30		46	39	52	20	24	0.50	0.69	0.53	o	0.75	0.83
Hillingdon, L.B.	Yiewsley	BM	Wellcome	1L24/27.1	80	54	47	31		13	33	53	13	23	0.57	0.68	0.16	p	0.62	0.57
Hillingdon, L.B.	Yiewsley	BM	Wellcome	1L25/1.1	81	50	38	29		26	26	43	10	27	0.58	0.62	0.32	p	0.60	0.37
Hillingdon, L.B.	Hillingdon	BM	Wellcome	1L25/3.1	120	84	81	46		40	48	79	22	34	0.55	0.70	0.33	p	0.61	0.65
Hillingdon, L.B.	Odell's Pit, Dawley	ROM	Ll. Treacher	AD112	81	52	44	28	130.4	23	32	51	18	27	0.54	0.64	0.28	p	0.63	0.67
Hillingdon, L.B.	Odell's Pit, Dawley	ROM	Ll. Treacher	AD116	84	47	46	29	127.3	40	33	40	17	21	0.62	0.56	0.48	o	0.83	0.81
Hillingdon, L.B.	Eastwood's Pit	ROM	Ll. Treacher	AD550	157	83	65	40	469.9	32	34	83	18	36	0.48	0.53	0.20	p	0.41	0.50
Hillingdon, L.B.	Maynard's Pit	ROM	Ll. Treacher	AD577	73	62	60	30	157.4	25	44	55	21	23	0.48	0.85	0.34	p	0.80	0.91
Hillingdon, L.B.	Maynard's Pit	ROM	Ll. Treacher	AD78	113	87	76	38	364.8	40	47	57	20	37	0.44	0.77	0.35	o	0.82	0.54

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Hillingdon, L.B.	1L22/19.1	FG	slightly rolled	78	f	0	0	n	2				x						
Hillingdon, L.B.	1L22/20.1	J	slightly rolled	66	f	0	5	m	2						x				
Hillingdon, L.B.	1L22/20.2	JK	rolled	58	f	0	5	m	0										
Hillingdon, L.B.	1L22/21.1	K	slightly rolled	43	f	0	0	n	2										
Hillingdon, L.B.	1L22/21.2	H	slightly rolled	47	p	1	5	b	2										
Hillingdon, L.B.	1L22/21.3	HK	slightly rolled	46	f	0	5	m	2										
Hillingdon, L.B.	1L22/22.1	H	very fresh	64	p	1	10	b	0										
Hillingdon, L.B.	1L22/22.2		very fresh	74	f	0	0	n	2										
Hillingdon, L.B.	1L22/23.1	F	very rolled	47	u	0	15	b	0										
Hillingdon, L.B.	1L22/23.2	H	slightly rolled	43	f	1	5	m	2										
Hillingdon, L.B.	1L22/23.3	JK	very rolled	41	f	0	0	n	2										
Hillingdon, L.B.	1L22/23.4	H	slightly rolled	45	f	0	5	m	2										
Hillingdon, L.B.	1L22/24.1	F	rolled	44	f	0	0	n	2										
Hillingdon, L.B.	1L22/27.1	DF	very rolled	34	p	0	10	b	0										x
Hillingdon, L.B.	1L22/27.2	J	rolled	35	f	0	0	n	1										
Hillingdon, L.B.	1L22/27.3	F	very rolled	75	p	0	10	b	2			x							
Hillingdon, L.B.	1L22/27.4	F	very rolled	36	f	0	0	n	2										
Hillingdon, L.B.	1L22/27.5	K	very rolled	31	p	0	15	a	2						x				
Hillingdon, L.B.	1L23/1.1	G	very fresh	56	f	0	0	n	2										
Hillingdon, L.B.	1L23/1.2	D	very rolled	44	p	0	5	b	2										x

Hillingdon, L.B.	1L23/1.3	G	very rolled	75	p	0	5	a	2										
Hillingdon, L.B.	1L23/1.4	G	rolled	70	f	0	15	m	0					x					
Hillingdon, L.B.	1L23/1.5	E	very rolled	33	p	0	20	b	2				x						
Hillingdon, L.B.	1L23/10.1	GJ	slightly rolled	53	f	0	5	m	2								x		
Hillingdon, L.B.	1L23/10.2	HK	rolled	57	f	0	5	m	2										x
Hillingdon, L.B.	1L23/12.1	M	rolled	42	p	0	15	b	2			x	x						
Hillingdon, L.B.	1L23/12.2	J	very rolled	35	f	0	0	n	2										
Hillingdon, L.B.	1L23/12.3	G	very rolled	52	p	0	15	a	0										
Hillingdon, L.B.	1L23/12.4	J	very rolled	56	f	0	0	n	2										
Hillingdon, L.B.	1L23/12.5	F	slightly rolled	61	f	0	0	n	2										
Hillingdon, L.B.	1L23/13.1	FG	very fresh	65	p	0	5	b	2			x							
Hillingdon, L.B.	1L23/13.2	F	very fresh	46	p	0	35	b	0							x			
Hillingdon, L.B.	1L23/13.3	K	slightly rolled	61	f	0	0	n	0										
Hillingdon, L.B.	1L23/13.4	G	rolled	68	f	0	5	m	0										
Hillingdon, L.B.	1L23/13.5	M	rolled	62	f	0	5	a	2				x						
Hillingdon, L.B.	1L23/15.1	D	rolled	42	f	0	0	n	2										
Hillingdon, L.B.	1L23/16.1	F	slightly rolled	57	p	0	5	b	0										
Hillingdon, L.B.	1L23/16.2	DK	slightly rolled	59	p	0	15	b	2										
Hillingdon, L.B.	1L23/16.3	E	very rolled	36	f	0	0	n	2										
Hillingdon, L.B.	1L23/16.4	F	very rolled	42	f	0	10	m	2					x					
Hillingdon, L.B.	1L23/2.1	FG	very fresh	71	f	0	0	n	2										
Hillingdon, L.B.	1L23/2.2	F	very fresh	41	p	0	5	b	2										
Hillingdon, L.B.	1L23/2.3	D	slightly rolled	17	u	1	50	b	0					x		x			

Hillingdon, L.B.	1L23/2.4	EF	slightly rolled	30	f	0	0	n	2										
Hillingdon, L.B.	1L23/2.5	F	slightly rolled	44	p	0	10	b	0							x			
Hillingdon, L.B.	1L23/2.6	F	rolled	54	f	0	0	n	2										
Hillingdon, L.B.	1L23/2.7	E	rolled	30	f	0	0	n	2										x
Hillingdon, L.B.	1L23/2.8	E	very fresh	29	p	0	5	a	2										
Hillingdon, L.B.	1L23/21.1	D	very fresh	50	f	1	0	n	2										
Hillingdon, L.B.	1L23/22.1	DK	very rolled	41	p	0	10	b	2										
Hillingdon, L.B.	1L23/22.2	EF	very rolled	21	u	0	20	b	0					x					
Hillingdon, L.B.	1L23/22/ 3	E	very rolled	19	u	0	60	a	0										
Hillingdon, L.B.	1L23/23.1	FG	rolled	74	f	0	5	m	2										
Hillingdon, L.B.	1L23/24.1	D	very rolled		p	0	5	a	0										x
Hillingdon, L.B.	1L23/24.2	D	very rolled		f	0	0	n	2										x
Hillingdon, L.B.	1L23/25.1	E	very rolled		p	0	20	a	0										
Hillingdon, L.B.	1L23/25.2	D	very rolled	33	p	0	15	b	0										
Hillingdon, L.B.	1L23/25.3	G	very fresh	28	f	1	20	m	2								x		
Hillingdon, L.B.	1L23/25.4	DF	very rolled	50	f	0	0	n	2			x							
Hillingdon, L.B.	1L23/25.5	EF	very rolled	38	p	0	5	b	2										
Hillingdon, L.B.	1L23/7.1	FM	rolled	36	p	0	10	b	2					x					
Hillingdon, L.B.	1L23/7.2	EF	very rolled	23	p	0	10	b	1					x					
Hillingdon, L.B.	1L23/7.3	J	rolled	33	f	0	0	n	2								x		
Hillingdon, L.B.	1L23/7.4	F	slightly rolled	30	u	0	35	b	0										
Hillingdon, L.B.	1L23/7.5	K	very fresh	44	p	1	5	b	2										
Hillingdon, L.B.	1L23/7.6	EF	slightly rolled	21	f	1	0	n	2					x					

Hillingdon, L.B.	1L23/7.7	K	rolled	59	f	0	0	n	2					
Hillingdon, L.B.	1L23/7.8	DF	rolled	44	p	0	20	b	0		x			
Hillingdon, L.B.	1L24/10.1	G	very rolled	39	p	0	40	a	0	x				
Hillingdon, L.B.	1L24/10.2	EF	very rolled	26	u	0	10	b	0					
Hillingdon, L.B.	1L24/10.3	GK	very fresh	56	f	0	5	m	2					
Hillingdon, L.B.	1L24/10.4	G	very fresh	54	p	0	20	a	2					
Hillingdon, L.B.	1L24/11.1	D	very fresh	64	p	0	20	a	0					
Hillingdon, L.B.	1L24/11.2	G	very rolled	43	f	0	10	m	2					
Hillingdon, L.B.	1L24/11.3	FG	very rolled	63	f	0	5	m	0		x			
Hillingdon, L.B.	1L24/11.4	DK	very rolled	36	f	0	5	m	2					
Hillingdon, L.B.	1L24/11.5	K	rolled	34	p	0	10	b	0					
Hillingdon, L.B.	1L24/12.1	GK	very rolled	51	f	0	0	n	2					
Hillingdon, L.B.	1L24/12.2	D	very rolled		f	0	0	n	2					
Hillingdon, L.B.	1L24/12.3	F	very rolled		f	0	0	n	2					
Hillingdon, L.B.	1L24/12.4	H	very rolled	56	f	0	5	m	0					x
Hillingdon, L.B.	1L24/13.1	D	slightly rolled	40	f	1	5	a	0					
Hillingdon, L.B.	1L24/13.2	G	very rolled	46	p	0	10	b	2					
Hillingdon, L.B.	1L24/13.3	DF	very rolled	40	f	1	0	n	2					x
Hillingdon, L.B.	1L24/18.1	D	rolled	35	p	0	30	a	0					
Hillingdon, L.B.	1L24/21.1	J	rolled	38	p	0	15	a	0		x			
Hillingdon, L.B.	1L24/21.2	GK	very rolled	46	f	0	0	n	2					
Hillingdon, L.B.	1L24/21.3	DF	slightly rolled	35	p	0	30	b	0			x	x	
Hillingdon, L.B.	1L24/21.4	D	very rolled		f	0	0	n	2					

Hillingdon, L.B.	1L24/21.5	E	very rolled		f	0	0	n	2		
Hillingdon, L.B.	1L24/22.1	EF	rolled	49	f	0	0	n	2		
Hillingdon, L.B.	1L24/22.2	D	very rolled	50	f	0	5	m	0		x
Hillingdon, L.B.	1L24/22.3	D	very rolled	34	f	0	0	n	2		
Hillingdon, L.B.	1L24/22.4	D	very rolled	37	f	0	0	n	2		
Hillingdon, L.B.	1L24/22.5	DK	very rolled	35	f	0	0	n	2		
Hillingdon, L.B.	1L24/23.1	DF	very rolled		f	0	10	m	0		
Hillingdon, L.B.	1L24/23.2	DF	very rolled	69	f	0	5	m	0		
Hillingdon, L.B.	1L24/26.1	D	rolled	54	f	0	0	n	2		
Hillingdon, L.B.	1L24/26.2	E	rolled	20	f	0	0	n	2		
Hillingdon, L.B.	1L24/27.1	J	very rolled	43	f	0	10	m	2		
Hillingdon, L.B.	1L25/1.1	E	very rolled	25	p	0	15	a	0		
Hillingdon, L.B.	1L25/3.1	D	very rolled	50	f	0	35	m	0		
Hillingdon, L.B.	AD112	E	very rolled	19	f	0	0	n	2	8.25	
Hillingdon, L.B.	AD116	E	very rolled	21	f	0	0	n	2	6.19	
Hillingdon, L.B.	AD550	F	rolled	57	f	0	10	m	2	3.81	x
Hillingdon, L.B.	AD577	K	very rolled	34	f	0	0	n	2	3.56	
Hillingdon, L.B.	AD78	D	very rolled	21	p	0	15	b	0	9.49	

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/10.1	82	54	51	19	93	27	28	50	10	17	0.35	0.66	0.33	P	0.56	0.59
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/10.2	137	66	66	41	322	55	39	56	16	33	0.62	0.48	0.40	O	0.70	0.48
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/10.3	147	72	49	31	265	46	21	70	11	26	0.43	0.49	0.31	P	0.30	0.42
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/10.4	107	64	38	28	161	7	22	59	10	26	0.44	0.60	0.07	P	0.37	0.38
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/10.5	112	85	81	32	306	38	52	66	11	22	0.38	0.76	0.34	P	0.79	0.50
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/10.6	84	40	37	22	89	30	25	35	10	19	0.55	0.48	0.36	O	0.71	0.53
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/10.7	167	75	66	41	486	46	30	74	16	39	0.55	0.45	0.28	P	0.41	0.41
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/11.1	116	58	42	45	233	22	25	56	16	42	0.78	0.50	0.19	P	0.45	0.38
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/11.2	114	62	46	24	`162	28	29	55	11	24	0.39	0.54	0.25	P	0.53	0.46
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/11.3	105	53	38	27	126	29	26	47	14	24	0.51	0.50	0.28	P	0.55	0.58
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/11.4	108	61	51	26	183	29	31	57	15	26	0.43	0.56	0.27	P	0.54	0.58
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/11.5	127	67	59	43	280	38	32	65	14	38	0.64	0.53	0.30	P	0.49	0.37
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/11.6	125	75	60	45	332	31	33	71	15	44	0.60	0.60	0.25	P	0.46	0.34
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/11.7	132	72	71	35	387	70	47	58	24	30	0.49	0.55	0.53	O	0.81	0.80
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/12.1	85	64	62	29	153	28	35	55	12	24	0.45	0.75	0.33	P	0.64	0.50
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/12.2	101	54	49	36	182	27	24	52	13	36	0.67	0.53	0.27	P	0.46	0.36
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/12.3	53	46	39	24	53	16	24	45	11	23	0.52	0.87	0.30	P	0.53	0.48
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/12.4	96	53	52	35	163	42	28	37	14	35	0.66	0.55	0.44	O	0.76	0.40
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/12.5	87	51	45	34	112	32	20	46	10	34	0.67	0.59	0.37	O	0.43	0.29
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/14.1	86	69	62	18	106	27	46	61	9	15	0.26	0.80	0.31	P	0.75	0.60

Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/16.1	113	77	68	43	275	19	44	73	21	30	0.56	0.68	0.17	P	0.60	0.70
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/16.2	95	67	66	25	209	45	47	44	19	23	0.37	0.71	0.47	O	1.07	0.83
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/16.3	63	54	53	19	84	33	35	45	11	18	0.35	0.86	0.52	O	0.78	0.61
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/16.4	119	59	57	45	291	45	30	48	14	39	0.76	0.50	0.38	O	0.63	0.36
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/16.5	75	55	45	30	117	28	28	47	15	26	0.55	0.73	0.37	O	0.60	0.58
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/16.6	126	74	64	38	336	40	36	64	23	33	0.51	0.59	0.32	P	0.56	0.70
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/16.7	87	60	55	25	145	31	37	54	18	20	0.42	0.69	0.36	O	0.69	0.90
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/16.8	152	71	64	45	431	41	43	60	15	43	0.63	0.47	0.27	P	0.72	0.35
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/22.1	105	65	55	22	138	36	31	62	11	17	0.34	0.62	0.34	P	0.50	0.65
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/22.2	105	83	73	45	387	37	49	77	22	37	0.54	0.79	0.35	O	0.64	0.59
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/22.3	142	82	81	28	331	58	61	66	13	23	0.34	0.58	0.41	O	0.92	0.57
Iver	GWR Pit	BM	A.D. Lacaille	1B6/22.4	95	64	57	35	201	39	41	58	11	35	0.55	0.67	0.41	O	0.71	0.31
Iver	GWR Pit	BM	A.D. Lacaille	1B6/22.5	123	83	62	40	324	31	35	75	17	35	0.48	0.67	0.25	P	0.47	0.49
Iver	Unprovenanced	BM	A.D. Lacaille	1B6/22.6	60	48	44	38	97	19	20	46	15	36	0.79	0.80	0.32	P	0.43	0.42
Iver	1/4 mile s of church	BM	A.D. Lacaille	1B6/23.1	68	51	47	23	86	16	33	46	17	16	0.45	0.75	0.24	P	0.72	1.06
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/23.2	99	55	44	25	143	22	30	53	14	22	0.45	0.56	0.22	P	0.57	0.64
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/23.3	93	58	52	31	175	19	28	57	16	29	0.53	0.62	0.20	P	0.49	0.55
Iver	Purser's Pit	BM	A.D. Lacaille	1B6/23.4	127	70	67	42	334	68	41	59	17	34	0.60	0.55	0.54	O	0.69	0.50
Iver	Purser's Pit	BM	A.D. Lacaille	1B6/23.5	103	76	64	39	257	36	39	59	20	29	0.51	0.74	0.35	O	0.66	0.69
Iver	Purser's Pit	BM	A.D. Lacaille	1B6/23.6	53	37	30	28	45	20	18	31	11	25	0.76	0.70	0.38	O	0.58	0.44
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/23.7	119	80	67	42	409	20	34	79	21	41	0.53	0.67	0.17	P	0.43	0.51
Iver	GWR Pit	BM	A.D. Lacaille	1B6/23.8	57	49	37	25	78	16	24	47	16	23	0.51	0.86	0.28	P	0.51	0.70
Iver	Purser's Pit	BM	A.D. Lacaille	1B6/23.9	106	64	60	38	259	59	44	45	18	21	0.59	0.60	0.56	C	0.98	0.86

Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/24.1	101	56	54	32	173	33	37	50	14	23	0.57	0.55	0.33	P	0.74	0.61
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/24.2	85	61	60	26	164	42	40	48	18	27	0.43	0.72	0.49	O	0.83	0.67
Iver	Unprovenanced	BM	A.D. Lacaille	1B6/27.1	71	63	48	23	100	22	29	60	12	21	0.37	0.89	0.31	P	0.48	0.57
Iver	Unprovenanced	BM	A.D. Lacaille	1B6/27.2	112	68	42	30	184	20	30	67	12	30	0.44	0.61	0.18	P	0.45	0.40
Iver	Unprovenanced	BM	A.D. Lacaille	1B6/27.3	75	59	35	38	111	16	18	47	6	38	0.64	0.79	0.21	P	0.38	0.16
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/27.4	69	48	47	26	93	34	28	45	14	23	0.54	0.70	0.49	O	0.62	0.61
Iver	Unprovenanced	BM	A.D. Lacaille	1B6/27.5	114	55	51	44	277	48	40	48	23	42	0.80	0.48	0.42	O	0.83	0.55
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/27.6	74	62	45	33	129	20	27	60	9	29	0.53	0.84	0.27	P	0.45	0.31
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/27.7	99	59	53	33	174	31	35	56	13	33	0.56	0.60	0.31	P	0.63	0.39
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/27.8	96	54	49	34	63	27	32	53	12	26	0.63	0.56	0.28	P	0.60	0.46
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/27.9	66	44	43	20	151	29	26	37	11	17	0.45	0.67	0.44	O	0.70	0.65
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/5.1	125	82	77	44	475	48	52	74	27	31	0.54	0.66	0.38	O	0.70	0.87
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/5.2	118	79	75	44	333	50	36	54	28	32	0.56	0.67	0.42	O	0.67	0.88
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/5.3	98	61	60	29	207	49	38	52	14	30	0.48	0.62	0.50	O	0.73	0.47
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/5.4	77	48	45	36	107	26	25	44	14	34	0.75	0.62	0.34	P	0.57	0.41
Iver	Purser's Pit	BM	A.D. Lacaille	1B6/5.5	77	63	63	27	157	33	43	50	15	23	0.43	0.82	0.43	O	0.86	0.65
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/6.1	109	32	72	41	326	61	49	63	19	37	1.28	0.29	0.56	C	0.78	0.51
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/6.2	122	109	108	51	702	71	85	82	29	39	0.47	0.89	0.58	C	1.04	0.74
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/6.3	127	74	74	43	371	64	51	64	19	29	0.58	0.58	0.50	O	0.80	0.66
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/6.4	167	106	101	53	1023	106	95	89	28	42	0.50	0.63	0.63	C	1.07	0.67
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/7.1	68	56	55	33	140	37	44	51	18	24	0.59	0.82	0.54	O	0.86	0.75
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/7.2	68	55	55	32	131	32	34	53	19	20	0.58	0.81	0.47	O	0.64	0.95
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/7.3	98	55	49	29	180	33	41	52	26	24	0.53	0.56	0.34	P	0.79	1.08

Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/7.4	76	51	43	22	90	32	30	44	12	21	0.43	0.67	0.42	O	0.68	0.57
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/7.5	107	67	61	45	299	16	45	65	21	37	0.67	0.63	0.15	P	0.69	0.57
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/7.6	107	67	57	32	234	33	35	59	18	32	0.48	0.63	0.31	P	0.59	0.56
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/9.1	150	69	64	49	410	56	31	50	17	40	0.71	0.46	0.37	O	0.62	0.43
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/9.2	108	72	60	41	234	34	29	56	8	40	0.57	0.67	0.31	P	0.52	0.20
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/9.3	113	56	49	32	178	18	26	56	12	29	0.57	0.50	0.16	P	0.46	0.41
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B6/9.4	137	75	72	48	379	59	45	58	19	40	0.64	0.55	0.43	O	0.78	0.48
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/10.1	84	65	61	40	195	33	41	51	22	37	0.62	0.77	0.39	O	0.80	0.59
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/10.2	141	87	86	39	474	42	69	69	18	34	0.45	0.62	0.30	P	1.00	0.53
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/10.3	64	41	40	18	46	26	19	37	6	15	0.44	0.64	0.41	O	0.51	0.40
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/10.4	70	59	56	21	84	27	41	51	9	15	0.36	0.84	0.39	O	0.80	0.60
Iver	Unprovenanced	BM	A.D. Lacaille	1B7/12.1	98	65	50	27	174	21	23	64	16	27	0.42	0.66	0.21	P	0.36	0.59
Iver	Unprovenanced	BM	A.D. Lacaille	1B7/2.1	104	67	60	45	296	54	35	59	17	42	0.67	0.64	0.52	O	0.59	0.40
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/2.2	113	79	77	38	342	49	60	59	16	34	0.48	0.70	0.43	O	1.02	0.47
Iver	Unprovenanced	BM	A.D. Lacaille	1B7/2.3	79	59	48	21	115	16	29	58	12	18	0.36	0.75	0.20	P	0.50	0.67
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/2.4	119	76	70	29	236	45	48	67	16	22	0.38	0.64	0.38	O	0.72	0.73
Iver	Unprovenanced	BM	A.D. Lacaille	1B7/27.1	206	96	72	44	775	56	40	87	21	39	0.46	0.47	0.27	P	0.46	0.54
Iver	Unprovenanced	BM	A.D. Lacaille	1B7/27.2	177	100	75	51	821	54	44	99	20	51	0.51	0.56	0.31	P	0.44	0.39
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/5.1	131	88	77	38	516	34	58	84	24	23	0.43	0.67	0.26	P	0.69	1.04
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/5.2	113	69	62	31	224	35	38	54	17	22	0.45	0.61	0.31	P	0.70	0.77
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/5.3	104	85	59	37	291	24	41	76	17	30	0.44	0.82	0.23	P	0.54	0.57
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/5.4	81	67	51	36	182	11	37	66	14	25	0.54	0.83	0.14	P	0.56	0.56
Iver	Unprovenanced	BM	A.D. Lacaille	1B7/5.5	93	79	70	35	304	15	52	77	22	19	0.44	0.85	0.16	P	0.68	1.16

Iver	Unprovenanced	BM	A.D. Lacaille	1B7/5.6	87	61	58	30	161	38	32	58	14	23	0.49	0.70	0.44	O	0.55	0.61
Iver	Lavender's Pit, Mansion Ln	BM	A.D. Lacaille	1B7/6.1	157	92	81	43	648	60	58	90	21	43	0.47	0.59	0.38	O	0.64	0.49
Iver	GWR Pit	BM	W.A. Sturge	1B8/10.1	93	97	80	51	446	14	54	96	23	51	0.53	1.04	0.15	P	0.56	0.45
Iver	GWR Pit	BM	W.A. Sturge	1B8/10.2	166	94	89	33	620	52	55	89	24	33	0.35	0.57	0.31	P	0.62	0.73
Iver	GWR Pit	BM	W.A. Sturge	1B8/10.3	153	76	69	37	494	23	55	75	22	34	0.49	0.50	0.15	P	0.73	0.65
Iver	GWR Pit	BM	W.A. Sturge	1B8/10.4	84	58	45	26	128	18	27	56	14	26	0.45	0.69	0.21	P	0.48	0.54
Iver	GWR Pit	BM	Wellcome	1B8/13.1	119	66	49	47	277	29	39	64	20	44	0.71	0.55	0.24	P	0.61	0.45
Iver	GWR Pit	BM	Wellcome	1B8/13.2	97	68	66	35	223	30	38	57	18	25	0.51	0.70	0.31	P	0.67	0.72
Iver	GWR Pit	BM	Wellcome	1B8/13.3	107	79	71	38	310	42	41	68	23	29	0.48	0.74	0.39	O	0.60	0.79
Iver	GWR Pit	BM	Wellcome	1B8/13.4	69	52	50	24	90	23	27	45	16	24	0.46	0.75	0.33	P	0.60	0.67
Iver	GWR Pit	BM	Wellcome	1B8/13.5	74	50	48	28	96	48	38	31	15	25	0.56	0.68	0.65	C	1.23	0.60
Iver	Unprovenanced	BM	Wellcome	1B8/14.1	126	80	60	41	395	29	31	78	16	39	0.51	0.63	0.23	P	0.40	0.41
Iver	Unprovenanced	BM	Wellcome	1B8/14.2	126	77	62	45	395	32	33	72	23	35	0.58	0.61	0.25	P	0.46	0.66
Iver	Unprovenanced	BM	Wellcome	1B8/14.3	112	62	54	32	189	33	35	57	17	22	0.52	0.55	0.29	P	0.61	0.77
Iver	Unprovenanced	BM	Wellcome	1B8/14.4	110	73	64	36	267	26	39	71	15	33	0.49	0.66	0.24	P	0.55	0.45
Iver	Unprovenanced	BM	A.D. Lacaille	1B8/2.1	129	76	70	34	353	42	42	67	18	32	0.45	0.59	0.33	P	0.63	0.56
Iver	Unprovenanced	BM	A.D. Lacaille	1B8/2.2	125	87	67	49	441	32	42	88	16	49	0.56	0.70	0.26	P	0.48	0.33
Iver	Unprovenanced	BM	A.D. Lacaille	1B8/2.3	93	47	42	26	112	10	20	47	9	21	0.55	0.51	0.11	P	0.43	0.43
Iver	Unprovenanced	BM	A.D. Lacaille	1B8/2.4	131	76	61	45	340	31	37	76	12	32	0.59	0.58	0.24	P	0.49	0.38
Iver	Unprovenanced	BM	A.D. Lacaille	1B8/2.5	100	71	48	43	254	16	28	70	16	42	0.61	0.71	0.16	P	0.40	0.38
Iver	Unprovenanced	BM	Rutland	1B8/4.1	120	78	64	37	343	23	42	74	14	34	0.47	0.65	0.19	P	0.57	0.41
Iver	Unprovenanced	BM	Rutland	1B8/4.2	109	66	62	29	179	37	31	57	11	25	0.44	0.61	0.34	P	0.54	0.44
Iver	Unprovenanced	BM	Rutland	1B8/4.3	133	77	75	35	394	61	55	69	21	26	0.45	0.58	0.46	O	0.80	0.81
Iver	Unprovenanced	BM	Rutland	1B8/4.4	122	71	64	34	242	40	36	64	13	26	0.48	0.58	0.33	P	0.56	0.50

Iver	Unprovenanced	BM	Rutland	1B8/4.5	106	66	61	44	255	27	31	65	11	42	0.67	0.62	0.25	P	0.48	0.26
Iver	Unprovenanced	BM	Rutland	1B8/5.1	147	93	92	56	665	67	65	76	17	56	0.60	0.63	0.46	O	0.86	0.30
Iver	Unprovenanced	BM	Rutland	1B8/5.2	97	51	46	37	193	20	44	50	14	34	0.73	0.53	0.21	P	0.88	0.41
Iver	Unprovenanced	BM	Rutland	1B8/5.3	71	54	54	19	100	35	39	44	14	19	0.35	0.76	0.49	O	0.89	0.74
Iver	Unprovenanced	BM	Rutland	1B8/5.4	86	67	54	31	168	31	28	56	14	28	0.46	0.78	0.36	O	0.50	0.50
Iver	Unprovenanced	BM	Rutland	1B8/5.5	69	52	44	32	96	18	22	50	11	31	0.62	0.75	0.26	P	0.44	0.35
Iver	Unprovenanced	BM	Rutland	1B8/5.6	84	57	51	27	126	27	35	51	16	19	0.47	0.68	0.32	P	0.69	0.84
Iver	Unprovenanced	BM	W.A. Sturge	1B8/6.1	207	120	116	58	1477	75	100	116	28	37	0.48	0.58	0.36	O	0.86	0.76
Iver	Unprovenanced	BM	W.A. Sturge	1B8/6.2	148	70	65	29	339	43	39	68	15	28	0.41	0.47	0.29	P	0.57	0.54
Iver	Unprovenanced	BM	W.A. Sturge	1B8/6.3	133	82	69	42	471	38	42	79	21	38	0.51	0.62	0.29	P	0.53	0.55
Iver	Studd's Pit	BM	W.A. Sturge	1B8/7.1	134	75	73	42	415	40	27	69	39	38	0.56	0.56	0.30	P	0.39	1.03
Iver	Studd's Pit	BM	W.A. Sturge	1B8/7.2	100	58	44	33	140	25	24	56	12	31	0.57	0.58	0.25	P	0.43	0.39
Iver	Studd's Pit	BM	W.A. Sturge	1B8/7.3	128	77	58	42	330	24	31	77	14	36	0.55	0.60	0.19	P	0.40	0.39
Iver	Studd's Pit	BM	W.A. Sturge	1B8/7.4	149	89	76	40	543	42	58	74	16	38	0.45	0.60	0.28	P	0.78	0.42
Iver	Studd's Pit	BM	W.A. Sturge	1B8/7.5	142	70	47	29	255	41	29	66	13	25	0.41	0.49	0.29	P	0.44	0.52
Iver	Studd's Pit	BM	W.A. Sturge	1B8/7.6	88	60	48	26	131	24	25	57	11	21	0.43	0.68	0.27	P	0.44	0.52
Iver	Studd's Pit	BM	W.A. Sturge	1B8/7.7	121	81	53	41	350	28	32	78	15	37	0.51	0.67	0.23	P	0.41	0.41
Iver	Studd's Pit	BM	W.A. Sturge	1B8/8.1	123	64	59	40	301	50	27	59	14	33	0.63	0.52	0.41	O	0.46	0.42
Iver	Studd's Pit	BM	W.A. Sturge	1B8/8.2	91	59	54	30	161	16	25	58	14	28	0.51	0.65	0.18	P	0.43	0.50
Iver	Studd's Pit	BM	W.A. Sturge	1B8/8.3	94	58	47	35	158	26	21	54	12	33	0.60	0.62	0.28	P	0.39	0.36
Iver	Studd's Pit	BM	W.A. Sturge	1B8/8.4	118	74	56	38	291	22	26	72	14	34	0.51	0.63	0.19	P	0.36	0.41
Iver	Studd's Pit	BM	W.A. Sturge	1B8/8.5	109	61	50	33	241	19	31	59	16	27	0.54	0.56	0.17	P	0.53	0.59
Iver	Mead's Pit	BM	W.A. Sturge	1B8/9.1	119	72	66	42	351	37	44	64	20	32	0.58	0.61	0.31	P	0.69	0.63
Iver	Mead's Pit	BM	W.A. Sturge	1B8/9.2	131	77	62	33	308	43	31	63	14	26	0.43	0.59	0.33	P	0.49	0.54

Iver	Mead's Pit	BM	W.A. Sturge	1B8/9.3	147	86	71	59	704	57	48	72	28	50	0.69	0.59	0.39	O	0.67	0.56
Iver	Mead's Pit	BM	W.A. Sturge	1B8/9.4	93	58	50	32	157	20	25	58	11	31	0.55	0.62	0.22	P	0.43	0.35

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Iver	1B6/10.1	J	rolled		f	0	0	n	2	2.76					x				
Iver	1B6/10.2	F	very rolled		p	0	20	b	0	4.03		x							
Iver	1B6/10.3	M	rolled		p	0	5	b	2	4.48									
Iver	1B6/10.4	M	slightly rolled		u	0	5	b	0	2.83			x						
Iver	1B6/10.5	GJ	very rolled		f	0	0	n	2	4.03					x				
Iver	1B6/10.6	L	rolled		p	0	15	a	2	15					x	x			
Iver	1B6/10.7	FM	rolled		f	0	0	n	2	5.57	x	x	x						
Iver	1B6/11.1	FM	rolled		p	0	5	b	0	5.81	x								
Iver	1B6/11.2	F	very rolled		p	0	45	a	1	5.68	x								
Iver	1B6/11.3	DF	rolled		p	0	25	a	2	7.74	x								
Iver	1B6/11.4	DF	very rolled		p	0	40	a	0	6.6							x		
Iver	1B6/11.5	F	very rolled		f	0	5	b	0	3.76		x							
Iver	1B6/11.6	F	very rolled		f	0	0	n	2	2.5		x							
Iver	1B6/11.7	DK	very rolled		p	0	25	a	2	4.68									
Iver	1B6/12.1	JK	very rolled		f	0	0	n	2	4.45									
Iver	1B6/12.2	F	very rolled		f	0	5	m	2	5.73				x					
Iver	1B6/12.3	E	slightly rolled		f	0	15	m	2	3.71									
Iver	1B6/12.4	DF	very rolled		u	0	50	b	0	5.23						x			
Iver	1B6/12.5	F	rolled		p	0	10	m	2	4.1		x							
Iver	1B6/14.1	N	very rolled		f	0	0	n	2	3.07									

Iver	1B6/16.1	E	very rolled	f	0	15	m	2	10.1	x								
Iver	1B6/16.2	DK	very rolled	f	0	0	n	2	5.69									
Iver	1B6/16.3	K	very rolled	f	0	20	m	2	6.4									
Iver	1B6/16.4	FG	very rolled	f	0	10	m	0	4.61		x							
Iver	1B6/16.5	E	very rolled	u	0	25	b	2	7.33									
Iver	1B6/16.6	FG	very rolled	p	0	35	a	2	5.32				x				x	
Iver	1B6/16.7	K	very rolled	f	0	0	n	2	4.78									
Iver	1B6/16.8	L	very rolled	p	0	35	a	0	6.29						x			
Iver	1B6/22.1	F	rolled	f	0	0	n	2	4.91									
Iver	1B6/22.2	E	rolled	f	0	0	n	2	13.64									
Iver	1B6/22.3	DK	very rolled	f	1	0	n	2	4.83									
Iver	1B6/22.4	G	slightly rolled	p	0	15	b	2	4.24									
Iver	1B6/22.5	FG	very rolled	p	0	5	a	2	6.12				x			x		
Iver	1B6/22.6	E	rolled	f	0	0	n	2	8.95									
Iver	1B6/23.1	K	very rolled	f	0	0	n	2	3.19									
Iver	1B6/23.2	L	very rolled	p	0	40	a	0	9.15						x			
Iver	1B6/23.3	J	very rolled	f	0	0	n	2	4.49									
Iver	1B6/23.4	GK	very rolled	f	0	0	n	2	5.01									
Iver	1B6/23.5	E	very rolled	f	0	0	n	2	9.49							x		
Iver	1B6/23.6	J	very rolled	f	0	0	n	2	4.95									
Iver	1B6/23.7	DF	very rolled	p	0	10	a	2	6.64				x					
Iver	1B6/23.8	E	very rolled	f	0	0	n	2	4.36									
Iver	1B6/23.9	DK	very rolled	u	0	50	b	0	9.16									

Iver	1B6/24.1	GK	very rolled	f	0	0	n	2	5.09		x							
Iver	1B6/24.2	GH	very rolled	f	0	0	n	2	5.14									
Iver	1B6/27.1	E	very rolled	f	0	0	n	2	7.31									
Iver	1B6/27.2	M	rolled	f	0	0	n	2	4.82			x					x	
Iver	1B6/27.3	F	slightly rolled	f	0	0	n	2	6.92							x		
Iver	1B6/27.4	J	very rolled	f	0	0	n	2	3.52									
Iver	1B6/27.5	DF	rolled	f	0	0	n	2	6.16		x							
Iver	1B6/27.6	E	very rolled	u	0	5	b	2	7.9	x								
Iver	1B6/27.7	GJ	rolled	p	0	15	a	0	2.85									
Iver	1B6/27.8	F	slightly rolled	p	0	20	b	2	4.18		x							
Iver	1B6/27.9	E	rolled	f	0	15	b	2	4.96							x		
Iver	1B6/5.1	D	very rolled	p	0	25	a	2	4.05									
Iver	1B6/5.2	D	very rolled	f	0	20	m	2	10.95	x								
Iver	1B6/5.3	D	very rolled	u	0	30	b	2	5.11									
Iver	1B6/5.4	E	very rolled	b	0	10	b	0	4.41									
Iver	1B6/5.5	K	very rolled	f	0	0	n	1	3.67					x				
Iver	1B6/6.1	DF	very rolled	f	0	0	n	2	5.21									
Iver	1B6/6.2	H	very rolled	f	1	20	m	2	6.5									
Iver	1B6/6.3	DK	very rolled	f	0	5	m	2	3.49									
Iver	1B6/6.4	DK	very rolled	f	0	5	m	2	3.46					x				
Iver	1B6/7.1	E	very rolled	p	0	10	b	0	4.08									
Iver	1B6/7.2	E	very rolled	f	0	0	n	2	4.72									
Iver	1B6/7.3	E	very rolled	f	0	0	n	2	2.87									

Iver	1B6/7.4	E	very rolled	f	0	0	n	2	4.68							
Iver	1B6/7.5	DF	very rolled	p	0	10	b	2	4.79				x			
Iver	1B6/7.6	DF	very rolled	p	0	40	b	2	7.37				x			
Iver	1B6/9.1	F	very rolled	f	0	15	a	2	5.72							
Iver	1B6/9.2	F	very rolled	u	0	44	b	0	3.05						x	
Iver	1B6/9.3	F	rolled	f	0	0	n	2	7.31	x			x			x
Iver	1B6/9.4	L	very rolled	p	1	20	m	0	7.09	x					x	
Iver	1B7/10.1	E	rolled	f	0	0	n	2	6.36							
Iver	1B7/10.2	H	rolled	f	0	10	m	2	4.85							
Iver	1B7/10.3	E	rolled	f	0	0	n	2	7.77	x			x			
Iver	1B7/10.4	J	rolled	f	0	0	n	2	8.32							
Iver	1B7/12.1	FM	very rolled	p	0	30	a	2	5.48							
Iver	1B7/2.1	D	very rolled	u	0	0	n	2	16.37	x						
Iver	1B7/2.2	HK	rolled	f	0	15	m	0	5.95							
Iver	1B7/2.3	E	very rolled	u	0	20	b	2	5.21							
Iver	1B7/2.4	GK	very rolled	f	0	0	n	2	6.12							
Iver	1B7/27.1	M	rolled	u	0	10	b	2	3.09			x				
Iver	1B7/27.2	F	rolled	f	0	0	n	2	2.17							
Iver	1B7/5.1	FG	very rolled	f	0	0	n	2	3.16							
Iver	1B7/5.2	D	very rolled	f	0	0	n	2	4.77							x
Iver	1B7/5.3	E	very rolled	p	0	40	a	2	5.3	x						
Iver	1B7/5.4	E	very rolled	p	0	40	a	2	5.11							
Iver	1B7/5.5	E	very rolled	p	0	25	a	2	6.39							

Iver	1B7/5.6	E	rolled	p	0	5	b	2	7.21							x
Iver	1B7/6.1	FG	rolled	u	0	5	b	2	7.35	x						
Iver	1B8/10.1	E	very rolled	p	0	5	b	2	7.9							
Iver	1B8/10.2	F	rolled	f	0	0	n	2	3.08					x		
Iver	1B8/10.3	DK	very rolled	f	0	0	n	2	4.45							
Iver	1B8/10.4	E	very rolled	p	0	5	b	2	6.66	x						
Iver	1B8/13.1	DF	rolled	p	0	30	a	2	9.13	x	x					
Iver	1B8/13.2	E	very rolled	f	0	0	n	2	4.7							
Iver	1B8/13.3	DF	very rolled	f	0	0	n	2	5.79							
Iver	1B8/13.4	E	very rolled	f	0	0	n	2	4							
Iver	1B8/13.5	E	very rolled	f	0	0	n	2	6.26							
Iver	1B8/14.1	FM	very rolled	f	0	5	m	2	4.91	x			x			
Iver	1B8/14.2	DF	very rolled	p	0	25	b	0	2.12							
Iver	1B8/14.3	FM	rolled	f	0	0	n	2	9.28			x				
Iver	1B8/14.4	F	rolled	p	0	15	b	2	8.54							
Iver	1B8/2.1	F	rolled	p	0	20	b	2	6.83	x					x	
Iver	1B8/2.2	F	very rolled	f	0	5	m	2	3.44	x					x	
Iver	1B8/2.3	F	rolled	f	0	15	m	2	1.55							
Iver	1B8/2.4	F	very rolled	p	0	10	b	2	3.36	x			x			
Iver	1B8/2.5	FM	rolled	p	0	20	b	2	2.63				x			
Iver	1B8/4.1	FM	very rolled	f	0	0	n	2	3.04	x			x			
Iver	1B8/4.2	JK	rolled	f	0	15	m	2	2.92		x					
Iver	1B8/4.3	HK	very rolled	f	0	0	n	2	4.16							

Iver	1B8/4.4	F	slightly rolled	u	0	20	b	0	5.77	x						x	
Iver	1B8/4.5	F	slightly rolled	u	0	70	a	0	3.59	x			x				
Iver	1B8/5.1	HK	slightly rolled	f	1	0	n	2	3.61		x						
Iver	1B8/5.2	L	rolled	p	0	15	b	2	4.05		x						
Iver	1B8/5.3	K	very rolled	p	0	25	b	2	2.68								
Iver	1B8/5.4	EF	very rolled	f	0	0	n	2	1.92								
Iver	1B8/5.5	E	very rolled	p	0	10	b	2	5.1								
Iver	1B8/5.6	G	very rolled	f	0	0	n	2	4.07	x						x	
Iver	1B8/6.1	H	very fresh	f	0	5	n	2	2.09								
Iver	1B8/6.2	FG	rolled	f	0	0	n	2	1.3								
Iver	1B8/6.3	F	rolled	u	0	35	a	2	4.67	x					x	x	
Iver	1B8/7.1	F	very rolled	f	0	0	n	2	7.05								
Iver	1B8/7.2	F	rolled	f	0	0	n	2	4.42								
Iver	1B8/7.3	F	very rolled	f	0	0	n	2	5.43								
Iver	1B8/7.4	G	very rolled	u	0	20	b	0	5.35		x						x
Iver	1B8/7.5	M	very rolled	f	0	10	m	2	4.47								
Iver	1B8/7.6	EF	very rolled	f	0	0	n	2	4.38	x							
Iver	1B8/7.7	FM	very rolled	f	0	0	n	2	4.07								
Iver	1B8/8.1	FG	very rolled	f	0	0	n	2	3.17				x			x	
Iver	1B8/8.2	E	very rolled	f	0	0	n	2	5.74								
Iver	1B8/8.3	EF	very rolled	u	0	40	b	2	6.22								
Iver	1B8/8.4	F	very rolled	p	0	5	a	0	2.38							x	
Iver	1B8/8.5	DF	very rolled	p	0	5	b	2	5.64	x							

Iver	1B8/9.1	G	very rolled	f	0	15	m	2	3.63		x
Iver	1B8/9.2	F	very rolled	u	0	15	b	0	4.78		
Iver	1B8/9.3	D	very rolled	f	0	5	m	2	5.05		
Iver	1B8/9.4	F	very rolled	f	0	0	n	2	5.79		

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Kempston	Hall's Pit	BM	W.G. Smith	1A6/11.1	90	70	60	36	195	31	40	63	14	27	0.51	0.78	0.34	P	0.63	0.52
Kempston	Hall's Pit	BM	W.G. Smith	1A6/11.2	95	71	69	34	276	27	56	61	23	28	0.48	0.75	0.28	P	0.92	0.82
Kempston	Springfield Lodge	BM	W.G. Smith	1A6/12.1	70	46	45	37	111	32	29	34	14	23	0.80	0.66	0.46	O	0.85	0.61
Kempston	Springfield Pit	BM	W.G. Smith	1A6/13.1	94	84	65	26	229	23	42	78	13	24	0.31	0.89	0.24	P	0.54	0.54
Kempston	Springfield Pit	BM	W.G. Smith	1A6/13.2	99	61	44	27	134	22	27	59	13	22	0.44	0.62	0.22	P	0.46	0.59
Kempston	Springfield Pit	BM	W.G. Smith	1A6/13.3	159	93	86	40	485	46	49	86	17	39	0.43	0.58	0.29	P	0.57	0.44
Kempston	Springfield Pit	BM	W.G. Smith	1A6/13.4	85	52	50	27	133	42	32	48	14	21	0.52	0.61	0.49	O	0.67	0.67
Kempston	Springfield Pit	BM	W.G. Smith	1A6/14.1	92	82	70	49	360	11	49	81	20	45	0.60	0.89	0.12	P	0.60	0.44
Kempston	Springfield Pit	BM	W.G. Smith	1A6/14.2	93	51	46	42	169	23	21	50	13	35	0.82	0.55	0.25	P	0.42	0.37
Kempston	Springfield Pit	BM	W.G. Smith	1A6/14.3	88	65	56	27	150	29	31	54	16	20	0.42	0.74	0.33	P	0.57	0.80
Kempston	Springfield Pit	BM	W.G. Smith	1A6/14.4	98	59	56	32	178	30	36	30	14	29	0.54	0.60	0.31	P	1.20	0.48
Kempston	Springfield Pit	BM	W.G. Smith	1A6/14.5	102	82	81	43	398	53	55	67	21	42	0.52	0.80	0.52	O	0.82	0.50
Kempston	Springfield Pit	BM	W.G. Smith	1A6/14.6	88	56	51	33	175	27	35	55	14	30	0.59	0.64	0.31	P	0.64	0.47
Kempston	Springfield Pit	BM	W.G. Smith	1A6/15.1	125	71	67	40	363	51	40	62	14	35	0.56	0.57	0.41	O	0.65	0.40
Kempston	Springfield Pit	BM	W.G. Smith	1A6/15.2	113	72	60	38	234	30	33	69	13	35	0.53	0.64	0.27	P	0.48	0.37
Kempston	Springfield Pit	BM	W.G. Smith	1A6/15.3	76	67	62	28	133	28	38	59	18	13	0.42	0.88	0.37	O	0.64	1.38
Kempston	Springfield Pit	BM	W.G. Smith	1A6/15.4	90	60	50	26	130	32	28	52	13	20	0.43	0.67	0.36	O	0.54	0.65
Kempston	Springfield Pit	BM	W.G. Smith	1A6/15.5	88	55	54	22	120	43	33	49	13	21	0.40	0.63	0.49	O	0.67	0.62
Kempston	Springfield Pit	BM	W.G. Smith	1A6/16.1	132	70	64	47	469	39	42	60	24	40	0.67	0.53	0.30	P	0.70	0.60
Kempston	Springfield Pit	BM	W.G. Smith	1A6/16.2	126	83	83	48	420	61	49	80	26	39	0.58	0.66	0.48	O	0.61	0.67

Kempston	Springfield Pit	BM	W.G. Smith	1A6/16.3	108	68	59	42	259	33	34	66	12	35	0.62	0.63	0.31	P	0.52	0.34
Kempston	Springfield Pit	BM	W.G. Smith	1A6/17.1	129	71	55	47	347	35	36	69	16	47	0.66	0.55	0.27	P	0.52	0.34
Kempston	Springfield Pit	BM	W.G. Smith	1A6/17.2	87	57	57	33	142	44	33	48	14	26	0.58	0.66	0.51	O	0.69	0.54
Kempston	Springfield Pit	BM	W.G. Smith	1A6/18.1	76	62	62	25	122	26	41	54	13	24	0.40	0.82	0.34	P	0.76	0.54
Kempston	Springfield Pit	BM	W.G. Smith	1A6/18.2	106	62	48	30	169	33	24	58	12	30	0.48	0.58	0.31	P	0.41	0.40
Kempston	Springfield Pit	BM	W.G. Smith	1A6/18.3	96	65	54	32	155	22	34	60	11	30	0.49	0.68	0.23	P	0.57	0.37
Kempston	Springfield Pit	BM	W.G. Smith	1A6/18.4	94	59	48	48	201	33	32	53	10	41	0.81	0.63	0.35	O	0.60	0.24
Kempston	Springfield Pit	BM	W.G. Smith	1A6/18.5	75	46	38	32	97	17	23	45	8	29	0.70	0.61	0.23	P	0.51	0.28
Kempston	Springfield Pit	BM	W.G. Smith	1A6/18.6	91	56	54	38		34	36	52	16	35	0.68	0.62	0.37	O	0.69	0.46
Kempston	Springfield Pit	BM	W.G. Smith	1A6/19.1	93	74	62	38	247	16	36	74	18	35	0.51	0.80	0.17	P	0.49	0.51
Kempston	Springfield Pit	BM	W.G. Smith	1A6/19.2	113	56	52	37	193	36	33	53	14	31	0.66	0.50	0.32	P	0.62	0.45
Kempston	Springfield Pit	BM	W.G. Smith	1A6/19.3	99	49	43	31	135	28	22	45	10	31	0.63	0.49	0.28	P	0.49	0.32
Kempston	Springfield Pit	BM	W.G. Smith	1A6/19.4	101	48	42	17	82	30	23	40	8	16	0.35	0.48	0.30	P	0.58	0.50
Kempston	Springfield Pit	BM	W.G. Smith	1A6/19.5	80	58	52	31	126	25	30	48	13	31	0.53	0.73	0.31	P	0.63	0.42
Kempston	Springfield Pit	BM	W.G. Smith	1A6/19.6	75	52	46	27	110	30	35	46	15	26	0.52	0.69	0.40	O	0.76	0.58
Kempston	Springfield Pit	BM	W.G. Smith	1A6/21.1	109	52	45	32	163	34	25	51	9	29	0.62	0.48	0.31	P	0.49	0.31
Kempston	Springfield Pit	BM	W.G. Smith	1A6/21.2	69	49	44	29	84	25	30	41	12	25	0.59	0.71	0.36	O	0.73	0.48
Kempston	Springfield Pit	BM	W.G. Smith	1A6/21.3	86	54	38	29	105	18	28	54	9	29	0.54	0.63	0.21	P	0.52	0.31
Kempston	Springfield Pit	BM	W.G. Smith	1A6/21.4	82	68	66	26	161	39	48	58	20	16	0.38	0.83	0.48	O	0.83	1.25
Kempston	Springfield Pit	BM	W.G. Smith	1A6/21.5	119	65	54	31	202	36	37	63	11	26	0.48	0.55	0.30	P	0.59	0.42
Kempston	Stewarts Pit/ Teedon's Pit	BM	W.G. Smith	1A6/22.1	152	70	63	40	459	40	57	63	18	33	0.57	0.46	0.26	P	0.90	0.55
Kempston	Stewarts Pit/ Teedon's Pit	BM	W.G. Smith	1A6/22.2	91	74	70	29	224	20	41	72	15	27	0.39	0.81	0.22	P	0.57	0.56
Kempston	Stewarts Pit/ Teedon's Pit	BM	W.G. Smith	1A6/22.3	115	66	65	38	264	42	38	61	18	31	0.58	0.57	0.37	O	0.62	0.58

Kempston	Williamson's Pit	BM	W.G. Smith	1A6/23.1	110	61	59	34	229	55	43	46	19	26	0.56	0.55	0.50	O	0.93	0.73
Kempston	Williamson's Pit	BM	W.G. Smith	1A6/23.2	81	50	39	26	98	27	25	47	12	25	0.52	0.62	0.33	P	0.53	0.48
Kempston	Williamson's Pit	BM	W.G. Smith	1A6/23.3	81	59	58	30	136	35	41	48	15	24	0.51	0.73	0.43	O	0.85	0.63
Kempston	Williamson's Pit	BM	W.G. Smith	1A6/23.4	110	84	72	42	341	35	49	74	19	39	0.50	0.76	0.32	P	0.66	0.49
Kempston	Williamson's Pit	BM	W.G. Smith	1A6/24.1	103	73	73	38	283	45	53	60	22	35	0.52	0.71	0.44	O	0.88	0.63
Kempston	Williamson's Pit	BM	W.G. Smith	1A6/24.2	85	69	65	32	209	29	50	65	22	28	0.46	0.81	0.34	P	0.77	0.79
Kempston	Williamson's Pit	BM	W.G. Smith	1A6/24.3	151	96	88	51	662	47	64	88	20	45	0.53	0.64	0.31	P	0.73	0.44
Kempston	Kempston	BM	W.G. Smith	1A6/25.1	131	73	66	44	369	49	43	70	16	41	0.60	0.56	0.37	O	0.61	0.39
Kempston	Kempston	BM	W.G. Smith	1A6/25.2	158	108	97	33	642	56	61	86	23	29	0.31	0.68	0.35	O	0.71	0.79
Kempston	Kempston	BM	W.G. Smith	1A6/26.1	103	51	38	33	135	32	19	46	11	33	0.65	0.50	0.31	P	0.41	0.33
Kempston	Kempston	BM	W.G. Smith	1A6/26.2	104	57	54	47	242	25	38	54	16	32	0.82	0.55	0.24	P	0.70	0.50
Kempston	Kempston	BM	W.G. Smith	1A6/27.1	89	53	39	24	98	18	24	51	8	21	0.45	0.60	0.20	P	0.47	0.38
Kempston	Kempston	BM	W.G. Smith	1A6/27.2	105	78	75	41	361	64	70	61	18	39	0.53	0.74	0.61	C	1.15	0.46
Kempston	Kempston	BM	W.G. Smith	1A6/27.3	68	46	39	33	106	25	29	42	14	31	0.72	0.68	0.37	O	0.69	0.45
Kempston	Kempston	BM	W.G. Smith	1A6/27.4	133	70	47	41	280	41	32	59	16	35	0.59	0.53	0.31	P	0.54	0.46
Kempston	Kempston	BM	W.G. Smith	1A6/27.5	68	61	58	24		29	47	61	24	15	0.39	0.90	0.43	O	0.77	1.60
Kempston	Kempston	BM	W.G. Smith	1A6/4.1	66	46	42	27	71	23	27	42	12	21	0.59	0.70	0.35	O	0.64	0.57
Kempston	Kempston	BM	W.G. Smith	1A6/4.2	80	67	58	36	165	14	29	66	13	30	0.54	0.84	0.18	P	0.44	0.43
Kempston	Kempston	BM	W.G. Smith	1A6/4.3	96	51	50	30	131	34	30	47	17	18	0.59	0.53	0.35	O	0.64	0.94
Kempston	Kempston	BM	W.G. Smith	1A6/4.4	99	62	58	30	165	32	35	55	12	26	0.48	0.63	0.32	P	0.64	0.46
Kempston	Kempston	BM	W.G. Smith	1A6/4.5	127	61	54	31	190	36	28	55	9	24	0.51	0.48	0.28	P	0.51	0.38
Kempston	Kempston	BM	W.G. Smith	1A6/5.1	67	48	40	19	55	15	29	46	7	17	0.40	0.72	0.22	P	0.63	0.41
Kempston	Kempston	BM	W.G. Smith	1A6/5.2	107	74	62	51	351	18	40	75	23	51	0.69	0.69	0.17	P	0.53	0.45

Kempston	Kempston	BM	W.G. Smith	1A6/6.1	86	51	50	26	123	41	39	42	17	20	0.51	0.59	0.48	O	0.93	0.85
Kempston	Kempston	BM	W.G. Smith	1A6/6.2	104	87	86	46	374	39	58	61	20	38	0.53	0.84	0.38	P	0.95	0.53
Kempston	Kempston	BM	W.G. Smith	1A6/6.3	87	58	56	26	150	31	41	51	16	20	0.45	0.67	0.36	P	0.80	0.80
Kempston	Kempston	BM	W.G. Smith	1A6/6.4	116	86	81	39	379	34	55	85	23	26	0.45	0.74	0.29	P	0.65	0.88
Kempston	Kempston	BM	W.G. Smith	1A6/6.5	104	90	87	42	407	49	55	82	22	34	0.47	0.87	0.47	O	0.67	0.65
Kempston	Kempston	BM	W.G. Smith	1A6/6.6	85	50	49	30	122	35	38	39	14	27	0.60	0.59	0.41	O	0.97	0.52
Kempston	Kempston	BM	W.G. Smith	1A6/7.2	154	81	72	34	404	90	64	46	19	34	0.42	0.53	0.58	C	1.39	0.56
Kempston	Kempston	BM	W.G. Smith	1A6/7.3	100	64	59	34	226	43	34	55	15	33	0.53	0.64	0.43	O	0.62	0.45
Kempston	Kempston	BM	W.G. Smith	1A6/7.4	83	54	54	25	128	41	38	49	10	25	0.46	0.65	0.49	O	0.78	0.40
Kempston	Kempston	BM	W.G. Smith	1A6/7.5	102	61	61	25	183	51	39	50	19	26	0.41	0.60	0.50	O	0.78	0.73
Kempston	Kempston	BM	W.G. Smith	1A6/8.1	90	65	60	26	161	36	34	54	20	21	0.40	0.72	0.40	O	0.63	0.95
Kempston	Kempston	BM	W.G. Smith	1A6/8.2	81	64	61	33	163	24	36	58	16	25	0.52	0.79	0.30	P	0.62	0.64
Kempston	Kempston	BM	W.G. Smith	1A6/8.3	117	80	67	33	316	38	48	78	19	32	0.41	0.68	0.32	P	0.62	0.59
Kempston	Kempston	BM	W.G. Smith	1A6/8.4	121	79	73	42	327	44	45	64	18	26	0.53	0.65	0.36	O	0.70	0.69
Kempston	Kempston	BM	W.G. Smith	1A6/8.5	94	60	59	32	169	46	40	48	14	28	0.53	0.64	0.49	O	0.83	0.50
Kempston	Kempston	BM	W.G. Smith	1A6/8.6	77	48	41	36	127	27	29	46	13	34	0.75	0.62	0.35	O	0.63	0.38
Kempston	Kempston	BM	W.G. Smith	1A7/1.1	91	64	59	28	168	21	36	63	11	22	0.44	0.70	0.23	P	0.57	0.50
Kempston	Kempston	BM	W.G. Smith	1A7/1.2	100	68	63	34	204	25	43	63	12	31	0.50	0.68	0.25	P	0.68	0.39
Kempston	Kempston	BM	W.G. Smith	1A7/1.3	99	64	58	31	173	32	29	63	14	25	0.48	0.65	0.32	P	0.46	0.56
Kempston	Kempston	BM	W.G. Smith	1A7/1.4	107	71	63	25	217	37	34	63	15	23	0.35	0.66	0.35	O	0.54	0.65
Kempston	Kempston	BM	W.G. Smith	1A7/1.5	120	72	59	42	334	28	43	70	18	35	0.58	0.60	0.23	P	0.61	0.51
Kempston	Kempston	BM	W.G. Smith	1A7/13.1	144	84	72	59	645	45	56	81	27	38	0.70	0.58	0.31	P	0.69	0.71
Kempston	Kempston	BM	W.G. Smith	1A7/13.2	155	99	85	56	663	31	61	77	25	33	0.57	0.64	0.20	P	0.79	0.76

Kempston	Kempston	BM	W.G. Smith	1A7/14.1	81	47	39	24	82	23	23	47	10	19	0.51	0.58	0.28	P	0.49	0.53
Kempston	Kempston	BM	W.G. Smith	1A7/14.2	82	68	48	45	176	8	35	66	13	40	0.66	0.83	0.10	P	0.53	0.33
Kempston	Kempston	BM	W.G. Smith	1A7/14.3	66	49	47	23	86	20	34	46	13	19	0.47	0.74	0.30	P	0.74	0.68
Kempston	Kempston	BM	W.G. Smith	1A7/14.4	69	56	39	26	79	8	21	53	8	23	0.46	0.81	0.12	P	0.40	0.35
Kempston	Kempston	BM	W.G. Smith	1A7/14.5	102	83	75	43	337	23	55	69	22	21	0.52	0.81	0.23	P	0.80	1.05
Kempston	Kempston	BM	W.G. Smith	1A7/14.6	80	52	49	23		15	36	51	10	19	0.44	0.65	0.19	P	0.71	0.53
Kempston	Kempston	BM	W.G. Smith	1A7/2.1	118	67	63	37	264	34	41	62	16	30	0.55	0.57	0.29	P	0.66	0.53
Kempston	Kempston	BM	W.G. Smith	1A7/2.2	112	68	64	42	275	37	37	57	18	34	0.62	0.61	0.33	P	0.65	0.53
Kempston	Kempston	BM	W.G. Smith	1A7/2.3	103	55	47	33	172	30	26	49	13	31	0.60	0.53	0.29	p	0.53	0.42
Kempston	Kempston	BM	W.G. Smith	1A7/2.4	124	65	49	43	237	32	24	63	16	36	0.66	0.52	0.26	P	0.38	0.44
Kempston	Kempston	BM	W.G. Smith	1A7/24.1	75	50	46	30	99	23	28	48	10	27	0.60	0.67	0.31	P	0.58	0.37
Kempston	Kempston	BM	W.G. Smith	1A7/24.2	88	70	70	20	136	41	54	53	12	14	0.29	0.80	0.47	O	1.02	0.86
Kempston	Kempston	BM	W.G. Smith	1A7/24.3	104	59	46	36	242	25	29	57	14	31	0.61	0.57	0.24	P	0.51	0.45
Kempston	Kempston	BM	W.G. Smith	1A7/24.4	95	50	48	25	104	37	21	19	11	38	0.50	0.53	0.39	O	1.11	0.29
Kempston	Kempston	BM	W.G. Smith	1A7/24.5	94	50	49	25		33	21	38	9	22	0.50	0.53	0.35	O	0.55	0.41
Kempston	Kempston	BM	W.G. Smith	1A7/26.1	76	41	37	19	53	23	22	34	10	15	0.46	0.54	0.30	P	0.65	0.67
Kempston	Kempston	BM	W.G. Smith	1A7/26.2	70	42	40	20	54	27	21	40	5	19	0.48	0.60	0.39	O	0.53	0.26
Kempston	Kempston	BM	W.G. Smith	1A7/26.5	66	43	40	20	59	24	23	40	10	19	0.47	0.65	0.36	O	0.58	0.53
Kempston	Kempston	BM	W.G. Smith	1A7/3.1	92	66	48	26	127	28	27	60	12	22	0.39	0.72	0.30	P	0.45	0.55
Kempston	Kempston	BM	W.G. Smith	1A7/3.2	113	86	84	37	339	43	52	66	15	30	0.43	0.76	0.38	O	0.79	0.50
Kempston	Kempston	BM	W.G. Smith	1A7/3.3	119	73	72	37	321	53	42	63	23	34	0.51	0.61	0.45	O	0.67	0.68
Kempston	Kempston	BM	W.G. Smith	1A7/3.4	110	73	60	38	284	22	36	73	18	38	0.52	0.66	0.20	P	0.49	0.47
Kempston	Kempston	BM	W.G. Smith	1A7/3.5	94	56	50	30	140	32	29	46	9	22	0.54	0.60	0.34	P	0.63	0.41

Kempston	Kempston	BM	W.G. Smith	1A7/3.6	114	59	57	37	244	53	38	51	14	32	0.63	0.52	0.46	O	0.75	0.44
Kempston	Kempston	BM	W.G. Smith	1A7/4.1	101	79	75	38	274	40	44	61	15	33	0.48	0.78	0.40	O	0.72	0.45
Kempston	Kempston	BM	W.G. Smith	1A7/4.2	140	79	68	42	364	37	38	71	18	38	0.53	0.56	0.26	P	0.54	0.47
Kempston	Kempston	BM	W.G. Smith	1A7/4.3	83	63	59	48	239	30	35	59	15	40	0.76	0.76	0.36	O	0.59	0.38
Kempston	Kempston	BM	W.G. Smith	1A7/5.1	126	86	77	42	468	28	54	82	21	34	0.49	0.68	0.22	P	0.66	0.62
Kempston	Kempston	BM	W.G. Smith	1A7/5.2	145	87	74	34	470	52	51	77	15	28	0.39	0.60	0.36	O	0.66	0.54
Kempston	Kempston	BM	W.G. Smith	1A7/5.3	90	65	58	40	242	16	34	65	17	26	0.62	0.72	0.18	P	0.52	0.65
Kempston	Kempston	BM	W.G. Smith	1A7/5.4	81	69	68	33	169	26	41	65	22	27	0.48	0.85	0.32	P	0.63	0.81
Kempston	Kempston	BM	W.G. Smith	1A7/6.1	121	58	53	35	192	60	39	31	14	23	0.60	0.48	0.50	O	1.26	0.61
Kempston	Kempston	BM	W.G. Smith	1A7/6.2	101	93	91	51	599	73	88	85	38	36	0.55	0.92	0.72	C	1.04	1.06
Kempston	Kempston	BM	W.G. Smith	1A7/8.1	91	56	50	26	129	25	28	54	14	20	0.46	0.62	0.27	P	0.52	0.70
Kempston	Kempston	BM	W.G. Smith	1A7/8.2	102	67	54	41	208	24	32	48	17	32	0.61	0.66	0.24	P	0.67	0.53
Kempston	Kempston	BM	W.G. Smith	1A7/8.3	136	95	88	45	583	43	62	86	23	34	0.47	0.70	0.32	P	0.72	0.68
Kempston	Kempston	BM	W.G. Smith	1A7/8.4	75	55	54	26	113	31	35	48	13	25	0.47	0.73	0.41	O	0.73	0.52
Kempston	Kempston	BM	W.G. Smith	1A7/8.5	157	87	62	48	457	36	42	83	14	48	0.55	0.55	0.23	P	0.51	0.29
Kempston	Kempston	BM	W.G. Smith	1A8/3.1	119	103	91	45	596	35	73	99	19	45	0.44	0.87	0.29	P	0.74	0.42
Kempston	Kempston	BM	W.G. Smith	1A8/4.1	180	86	70	34	545	43	43	84	16	30	0.40	0.48	0.24	P	0.51	0.53
Kempston	Kempston	BM	W.G. Smith	1A8/4.2	104	61	57	35	322	21	31	61	11	34	0.57	0.59	0.20	P	0.51	0.32
Kempston	Kempston	BM	W.G. Smith	1A8/4.3	131	75	59	36	205	22	38	75	17	33	0.48	0.57	0.17	P	0.51	0.52
Kempston	Kempston	BM	W.G. Smith	1A8/4.4	148	81	64	49	413	30	36	78	15	47	0.60	0.55	0.20	P	0.46	0.32
Kempston	Kempston	BM	W.G. Smith	1A8/4.5	118	69	61	46	327	20	38	69	17	46	0.67	0.58	0.17	P	0.55	0.37
Kempston	Kempston	BM	W.G. Smith	1A8/4.6	117	70	58	21	170	40	34	61	11	21	0.30	0.60	0.34	P	0.56	0.52
Kempston	Kempston	BM	W.G. Smith	1A8/5.1	96	63	52	32	139	27	32	60	11	32	0.51	0.66	0.28	P	0.53	0.34

Kempston	Kempston	BM	W.G. Smith	1A8/5.2	138	76	66	36	308	47	40	63	11	35	0.47	0.55	0.34	P	0.63	0.31
Kempston	Kempston	BM	W.G. Smith	1A8/5.3	117	65	64	29	233	47	40	55	14	22	0.45	0.56	0.40	O	0.73	0.64
Kempston	Kempston	BM	W.G. Smith	1A8/5.4	80	67	63	25	136	27	39	58	13	23	0.37	0.84	0.34	P	0.67	0.57
Kempston	Kempston	BM	W.G. Smith	1A8/5.5	88	65	58	35	156	20	33	60	12	26	0.54	0.74	0.23	p	0.55	0.46
Kempston	Kempston	BM	W.G. Smith	1A8/5.6	82	57	45	17	68	26	23	50	8	16	0.30	0.70	0.32	P	0.46	0.50
Kempston	Kempston	BM	W.G. Smith	1A8/5.7	125	86	85	46	434	52	58	81	18	39	0.53	0.69	0.42	O	0.72	0.46
Kempston	Kempston	BM	W.G. Smith	1A8/5.8	97	60	47	30	169	17	32	59	12	29	0.50	0.62	0.18	P	0.54	0.41
Kempston	Kempston	BM	W.G. Smith	1A8/5.9	81	66	61	28	145	34	36	53	10	26	0.42	0.81	0.42	O	0.68	0.38
Kempston	Kempston	BM	W.G. Smith	1A8/6.1	117	81	70	32	308	34	42	78	17	29	0.40	0.69	0.29	P	0.54	0.59
Kempston	Kempston	BM	W.G. Smith	1A8/6.2	98	64	47	30	157	20	26	63	9	28	0.47	0.65	0.20	P	0.41	0.32
Kempston	Kempston	BM	W.G. Smith	1A8/6.3	119	69	55	26	157	36	33	57	13	25	0.38	0.58	0.30	P	0.58	0.52
Kempston	Kempston	BM	W.G. Smith	1A8/6.4	110	71	69	36	356	35	54	62	24	35	0.51	0.65	0.32	P	0.87	0.69
Kempston	Kempston	BM	W.G. Smith	1A8/6.5	124	71	65	33	265	38	30	56	15	30	0.46	0.57	0.31	P	0.54	0.50
Kempston	Kempston	BM	W.G. Smith	1A8/7.1	88	55	53	39	156	27	29	52	12	38	0.71	0.63	0.31	P	0.56	0.32
Kempston	Kempston	BM	W.G. Smith	1A8/7.2	70	52	50	26	98	27	35	46	11	24	0.50	0.74	0.39	O	0.76	0.46
Kempston	Kempston	BM	W.G. Smith	1A8/7.3	93	57	57	29	165	46	46	50	17	19	0.51	0.61	0.49	O	0.92	0.89
Kempston	Kempston	BM	W.G. Smith	1A8/7.4	95	58	50	37	197	28	27	55	15	32	0.64	0.61	0.29	P	0.49	0.47
Kempston	Ray's Pit	BM	W.G. Smith	1A8/8.1	98	67	54	38	196	28	31	64	12	31	0.57	0.68	0.29	P	0.48	0.39
Kempston	Ray's Pit	BM	W.G. Smith	1A8/8.2	129	68	64	39	332	41	42	65	16	35	0.57	0.53	0.32	P	0.65	0.46
Kempston	Ray's Pit	BM	W.G. Smith	1A8/8.3	108	66	65	40	300	50	42	60	16	36	0.61	0.61	0.46	O	0.70	0.44
Kempston	Ray's Pit	BM	W.G. Smith	1A8/8.4	115	84	83	35	397	52	57	72	21	29	0.42	0.73	0.45	O	0.79	0.72

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Kempston	1A6/11.1	E	very rolled	24	f	0	0	n	2	3.41									
Kempston	1A6/11.2	FG	very rolled	25	f	0	0	n	2	2.48									x
Kempston	1A6/12.1	E	rolled	26	u	0	40	b	0	3.7									
Kempston	1A6/13.1	DF	slightly rolled	24	u	0	30	a	2	5.77									
Kempston	1A6/13.2	EF	rolled	30	u	0	0	n	2	3.39			x						
Kempston	1A6/13.3	FG	very rolled	37	f	0	0	n	2	2.48				x					x
Kempston	1A6/13.4	JK	very rolled	16	u	0	55	b	0	4.93									
Kempston	1A6/14.1	D	very rolled	24	p	0	10	b	2	6.3									
Kempston	1A6/14.2	FM	very rolled	28	f	0	0	n	2	2.94			x						
Kempston	1A6/14.3	FM	very rolled	24	f	0	0	n	2	7.77				x					x
Kempston	1A6/14.4	FG	very rolled	20	p	0	15	b	0	14.38						x			x
Kempston	1A6/14.5	G	very rolled	28	p	0	5	b	2	6.41									x
Kempston	1A6/14.6	F	very rolled	29	p	0	5	b	0	5									x
Kempston	1A6/15.1	FG	very rolled	26	f	0	0	n	2	2.68									
Kempston	1A6/15.2	FM	rolled	29	p	0	5	b	2	2.83			x						x
Kempston	1A6/15.3	JK	very rolled	23	f	0	0	n	2	4.02					x				
Kempston	1A6/15.4	F	rolled	27	f	0	0	n	2	4.44									
Kempston	1A6/15.5	FG	slightly rolled	32	p	0	20	b	2	4.06									
Kempston	1A6/16.1	F	very rolled	37	f	0	0	n	2	4.79									
Kempston	1A6/16.2	G	very rolled	28	f	0	0	n	2	4.82	x								x

Kempston	1A6/16.3	F	rolled	27	p	0	30	b	2	3.4									
Kempston	1A6/17.1	F	rolled	31	p	0	15	a	0	7.69						x			
Kempston	1A6/17.2	E	rolled	33	f	0	0	n	0	12.94									
Kempston	1A6/18.1	E	very rolled		u	0	40	b	0	4.87									
Kempston	1A6/18.2	F	rolled	26	u	0	10	b	0	3.82									
Kempston	1A6/18.3	FG	rolled	25	f	0	0	n	2	7.12	x								
Kempston	1A6/18.4	F	very rolled	20	u	0	50	b	0	9.48	x								
Kempston	1A6/18.5	EF	very rolled		f	0	0	n	2	6.72									
Kempston	1A6/18.6	F	slightly rolled	24	p	0	5	b	2	3.76									x
Kempston	1A6/19.1	F	very rolled	28	p	0	10	b	2	4.23									x
Kempston	1A6/19.2	F	very rolled	28	p	0	40	a	2	5.72							x		
Kempston	1A6/19.3	F	very rolled		u	0	25	b	0	3.33							x		
Kempston	1A6/19.4	F	very rolled	18	u	0	45	b	0	3.61									
Kempston	1A6/19.5	E	rolled	24	u	0	30	b	0	10.73	x								x
Kempston	1A6/19.6	E	rolled	23	p	0	10	b	2	3.98						x			
Kempston	1A6/21.1	F	rolled	35	p	0	5	a	0	3.73							x		
Kempston	1A6/21.2	E	rolled	33	f	0	0	n	2	4.88		x							
Kempston	1A6/21.3	E	very rolled	29	f	0	5	m	2	3.76				x					
Kempston	1A6/21.4	K	very rolled	31	f	0	0	n	2	2.82									
Kempston	1A6/21.5	F	rolled	38	f	0	0	n	2	2.67									
Kempston	1A6/22.1	DK	rolled	49	f	0	0	n	2	6.28									
Kempston	1A6/22.2	J	very rolled		f	0	0	n	2	4.32									
Kempston	1A6/22.3	FG	very rolled	37	f	0	0	n	2	2.72									

Kempston	1A6/23.1	GK	very rolled	36	f	0	0	n	2	2.5								x	
Kempston	1A6/23.2	EF	rolled	26	f	0	0	n	2	5.06									
Kempston	1A6/23.3	E	very rolled	20	p	0	10	b	1	6.19									
Kempston	1A6/23.4	F	very rolled	38	p	0	5	b	2	3.72									x
Kempston	1A6/24.1	DK	rolled	31	f	0	0	n	2	4.74									
Kempston	1A6/24.2	F	very rolled	26	p	0	5	b	2	5.3									x
Kempston	1A6/24.3	F	slightly rolled	55	f	0	0	n	2	4.36									x
Kempston	1A6/25.1	FG	very rolled	30	f	0	0	n	2	4.17									
Kempston	1A6/25.2	FG	rolled	56	f	0	0	n	2	6.32									
Kempston	1A6/26.1	M	rolled	24	p	0	15	b	2	2.99			x						
Kempston	1A6/26.2	DF	very rolled	26	u	0	40	b	0	3.83		x				x			
Kempston	1A6/27.1	F	very fresh	23	u	0	45	b	0	5.88									
Kempston	1A6/27.2	H	rolled	30	u	0	10	b	0	1.69						x			
Kempston	1A6/27.3	E	rolled	16	p	0	40	a	2	7.91									
Kempston	1A6/27.4	M	slightly rolled	35	p	0	20	m	0	5.22			x						x
Kempston	1A6/27.5	F	slightly rolled	18	f	0	0	n	2	15.66									x
Kempston	1A6/4.1	E	slightly rolled	18	f	0	0	n	2	8.39									x
Kempston	1A6/4.2	E	rolled	29	f	0	0	n	2	6.55									x
Kempston	1A6/4.3	GK	rolled	30	f	0	0	n	2	3.99									
Kempston	1A6/4.4	F	rolled	29	f	0	0	n	2	3.37			x						
Kempston	1A6/4.5	F	slightly rolled	29	f	0	0	n	2	4.2		x						x	
Kempston	1A6/5.1	E	rolled	30	f	0	0	n	1	4.26									
Kempston	1A6/5.2	D	rolled	15	f	0	0	n	1	7.84									
Kempston	1A6/6.1	E	slightly rolled	25	f	0	0	n	2	5.85									

Kempston	1A6/6.2	D	rolled	23	f	0	0	n	2	6.48									x
Kempston	1A6/6.3	J	very rolled	31	f	0	0	n	2	5.09									
Kempston	1A6/6.4	FG	slightly rolled	39	f	0	10	m	1	3.89		x							x
Kempston	1A6/6.5	E	rolled	24	p	0	20	b	1	3.88									
Kempston	1A6/6.6	EF	very rolled	17	f	0	0	n	2	3.37									
Kempston	1A6/7.2	GJ	very fresh	45	f	0	0	n	2	9.42									x
Kempston	1A6/7.3	FG	very rolled	17	p	0	10	b	2	4.32									
Kempston	1A6/7.4	E	very rolled	16	u	0	45	b	0	7.64									
Kempston	1A6/7.5	EF	very rolled	17	u	0	65	b	0	7.14						x			
Kempston	1A6/8.1	FG	rolled	39	f	0	0	n	2	3.89									
Kempston	1A6/8.2	E	slightly rolled	33	f	0	20	m	0	4.21	x								
Kempston	1A6/8.3	F	very rolled		f	0	0	n	2	2.89									x
Kempston	1A6/8.4	G	very rolled	35	u	0	20	b	0	11.99									x
Kempston	1A6/8.5	FG	very rolled	23	f	0	0	n	2	3.78									x
Kempston	1A6/8.6	E	very rolled	24	p	0	10	b	2	6.82		x							
Kempston	1A7/1.1	E	very rolled	25	f	0	0	n	2	4.39									
Kempston	1A7/1.2	G	very rolled	24	f	0	0	n	2	5.8									
Kempston	1A7/1.3	F	very rolled	36	p	0	30	b	2	5.55									
Kempston	1A7/1.4	DF	very rolled	25	p	0	35	b	2	3.49			x						x
Kempston	1A7/1.5	DF	very rolled	37	f	0	5	m	2	10.6									x
Kempston	1A7/13.1	D	very rolled	32	f	0	0	n	2	9.13									
Kempston	1A7/13.2	FG	very rolled	39	f	0	25	a	0	15.28									x
Kempston	1A7/14.1	E	rolled	17	p	0	15	b	2	8.27									

Kempston	1A7/14.2	DF	very rolled	22	f	0	0	n	2			x							
Kempston	1A7/14.3	E	very rolled	25	f	0	0	n	2	4.1									
Kempston	1A7/14.4	JK	very rolled	16	f	0	0	n	2	2.79					x				
Kempston	1A7/14.5	EF	rolled	24	u	0	5	b	2	6.41									
Kempston	1A7/14.6	DF	rolled	29	f	0	0	n	2	7.76									x
Kempston	1A7/2.1	G	very rolled	39	f	0	0	n	2	4.76									
Kempston	1A7/2.2	DF	very rolled	35	f	0	0	n	2	9.79	x								
Kempston	1A7/2.3	F	very rolled	25	u	0	30	b	0	8.69	x								
Kempston	1A7/2.4	FM	very rolled		f	0	0	n	2	4.42									
Kempston	1A7/24.1	GH	very rolled	29	f	0	0	n	2	3.41									x
Kempston	1A7/24.2	FG	rolled	17	p	0	10	b	2	3.89									
Kempston	1A7/24.3	K	slightly rolled	31	f	0	0	n	2	3.94									
Kempston	1A7/24.4	E	slightly rolled	28	f	0	0	n	1	5.27									
Kempston	1A7/24.5	EF	slightly rolled	28	f	0	20	b	2	4.56			x						
Kempston	1A7/26.1	EF	slightly rolled	27	p	0	25	a	2	7.15								x	
Kempston	1A7/26.2	J	very fresh	21	f	0	0	n	1	4.1									
Kempston	1A7/26.5	E	slightly rolled	16	p	0	60	a	0	5.78									
Kempston	1A7/3.1	F	slightly rolled	30	p	0	5	b	2	4.5	x								
Kempston	1A7/3.2	G	very rolled	41	f	0	0	n	2	3.87									
Kempston	1A7/3.3	FG	very rolled		f	0	0	n	2	3.49									x
Kempston	1A7/3.4	DF	very rolled	32	f	0	0	n	2	4.15									
Kempston	1A7/3.5	F	rolled	35	f	0	0	n	2	6.48									
Kempston	1A7/3.6	L	rolled	32	f	0	0	n	2	4.22								x	

Kempston	1A7/4.1	G	very rolled	31	f	0	0	n	2	5.64								x	
Kempston	1A7/4.2	FM	rolled	27	f	0	0	n	1	5.43		x		x					
Kempston	1A7/4.3	E	very fresh	16	u	0	50	b	0	4.76									
Kempston	1A7/5.1	G	slightly rolled	27	f	0	20	m	1	3.19									
Kempston	1A7/5.2	FG	rolled	43	f	0	0	n	1	2.69								x	
Kempston	1A7/5.3	E	rolled	20	p	0	10	b	2	6.65									
Kempston	1A7/5.4	E	rolled	16	f	0	0	n	2	4.09									
Kempston	1A7/6.1	F	slightly rolled	22	u	0	50	b	0	9.73						x			
Kempston	1A7/6.2	HK	rolled	28	f	0	0	n	2	5.74									
Kempston	1A7/8.1	F	very rolled	25	f	0	0	n	2	5.95	x								
Kempston	1A7/8.2	F	very rolled	32	f	0	0	n	2	4.96									x
Kempston	1A7/8.3	FG	very rolled	46	f	0	0	n	2	3.4									x
Kempston	1A7/8.4	J	rolled	31	f	0	0	n	2	3.26									x
Kempston	1A7/8.5	FM	rolled	39	f	0	0	n	2	7.44			x						x
Kempston	1A8/3.1	G	rolled	44	f	0	0	n	2	5.44									x
Kempston	1A8/4.1	FM	slightly rolled	48	f	0	0	n	2	3.55		x		x					
Kempston	1A8/4.2	F	slightly rolled	25	f	0	0	n	2	3.44		x							
Kempston	1A8/4.3	F	rolled	40	f	0	0	n	2	3.02									
Kempston	1A8/4.4	FM	slightly rolled	44	p	0	10	b	2	7.44				x					
Kempston	1A8/4.5	F	rolled	37	f	0	0	n	2	1.7		x							
Kempston	1A8/4.6	F	slightly rolled	25	u	0	55	b	0	4.38						x			
Kempston	1A8/5.1	FM	rolled	31	f	0	0	n	2	5.18				x					
Kempston	1A8/5.2	F	rolled	38	u	0	50	a	0	9.71	x								
Kempston	1A8/5.3	FG	slightly rolled	37	p	0	10	b	1	4.7							x		
Kempston	1A8/5.4	E	rolled	21	f	0	0	n	2	5.76									
Kempston	1A8/5.5	E	rolled	25	p	0	10	b	0	6.04									

Kempston	1A8/5.6	EF	slightly rolled	21	p	0	5	b	2	4.96									
Kempston	1A8/5.7	GK	very rolled	41	p	0	20	a	0	2.41									
Kempston	1A8/5.8	F	rolled	22	p	0	5	b	2	3.91									
Kempston	1A8/5.9	E	very rolled	14	u	0	45	b	0	6.44									
Kempston	1A8/6.1	F	very rolled	38	p	0	45	a	2	4.38									
Kempston	1A8/6.2	F	slightly rolled	37	p	0	15	b	2	3.63									
Kempston	1A8/6.3	F	rolled	36	f	0	15	m	2	2.99									
Kempston	1A8/6.4	F	rolled	19	u	0	25	b	0	5.04									x
Kempston	1A8/6.5	FM	very rolled	18	u	0	30	b	0	10.15			x						
Kempston	1A8/7.1	E	slightly rolled	26	u	0	60	b	0	4.56				x		x			
Kempston	1A8/7.2	E	slightly rolled	17	p	0	5	b	1	3.62				x					
Kempston	1A8/7.3	GK	very rolled	36	u	0	0	n	2	6.07									
Kempston	1A8/7.4	EF	rolled	13	u	0	60	a	0	4.6									
Kempston	1A8/8.1	EF	very rolled	23	f	0	0	n	2	3.77									
Kempston	1A8/8.2	FG	rolled	48	f	0	0	n	2	6.14									
Kempston	1A8/8.3	FG	slightly rolled	32	p	0	45	a	2	4.94									
Kempston	1A8/8.4	GH	very rolled	34	p	0	15	a	2	4.1						x			

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Keswick	Keswick	BM	Newnham College	2A03.21.4	156	81	72	35		41	40	71	13	31	0.43	0.52	0.26	p	0.56	0.42
Keswick	Keswick	BM	Newnham College	2A03/18.1	245	121	111	43		66	68	113	21	39	0.36	0.49	0.27	p	0.60	0.54
Keswick	Keswick	BM	Newnham College	2A03/18.2	98	75	72	37		59	62	70	17	22	0.49	0.77	0.60	c	0.89	0.77
Keswick	Keswick	BM	Newnham College	2A03/18.3	159	91	84	54		51	56	85	20	56	0.59	0.57	0.32	p	0.66	0.36
Keswick	Keswick	BM	Newnham College	2A03/19.1	165	105	102	43		58	81	97	22	43	0.41	0.64	0.35	o	0.84	0.51
Keswick	Keswick	BM	Newnham College	2A03/19.2	148	66	54	38		21	34	61	15	37	0.58	0.45	0.14	p	0.56	0.41
Keswick	Keswick	BM	Newnham College	2A03/19.3	182	103	88	43		45	56	100	16	37	0.42	0.57	0.25	p	0.56	0.43
Keswick	Keswick	BM	Newnham College	2A03/20.1	142	87	74	50		38	43	86	15	43	0.57	0.61	0.27	p	0.50	0.35
Keswick	Keswick	BM	Newnham College	2A03/20.3	136	102	96	43		82	94	69	15	38	0.42	0.75	0.60	c	1.36	0.39
Keswick	Keswick	BM	Newnham College	2A03/20.4	161	86	84	33		66	47	74	18	28	0.38	0.53	0.41	o	0.64	0.64
Keswick	Keswick	BM	Newnham College	2A03/20.5	112	67	46	30		32	28	61	12	23	0.45	0.60	0.29	p	0.46	0.52
Keswick	Keswick	BM	Newnham College	2A03/21.1	156	100	95	40		44	72	86	16	34	0.40	0.64	0.28	p	0.84	0.47
Keswick	Keswick	BM	Newnham College	2A03/21.2	109	73	73	38		58	64	62	14	31	0.52	0.67	0.53	o	1.03	0.45
Keswick	Keswick	BM	Newnham College	2A03/21.3	124	94	88	34		69	84	69	17	31	0.36	0.76	0.56	c	1.22	0.55
Keswick	Keswick	BM	Newnham College	2A03/22.1	142	72	59	37		26	36	70	14	34	0.51	0.51	0.18	p	0.51	0.41
Keswick	Keswick	BM	Newnham College	2A03/22.2	125	82	79	28		35	58	75	17	19	0.34	0.66	0.28	p	0.77	0.89
Keswick	Keswick	BM	Newnham College	2A03/22.3	153	103	96	50		60	72	91	18	45	0.49	0.67	0.39	o	0.79	0.40
Keswick	Keswick	BM	Newnham College	2A03/22.4	135	68	37	39		34	24	66	15	33	0.57	0.50	0.25	p	0.36	0.45
Keswick	Keswick	BM	Newnham College	2A03/23.1	110	79	72	29		34	48	77	12	26	0.37	0.72	0.31	p	0.62	0.46
Keswick	Keswick	BM	Newnham College	2A03/23.2	202	110	105	41		58	68	98	20	40	0.37	0.54	0.29	p	0.69	0.50

Keswick	Keswick	BM	Newnham College	2A03/23.3	182	101	84	51		65	52	77	21	51	0.50	0.55	0.36	o	0.68	0.41
Keswick	Keswick	BM	Newnham College	2A03/23.4	137	86	75	38		39	53	82	16	38	0.44	0.63	0.28	p	0.65	0.42
Keswick	Keswick	BM	Newnham College	2A03/24.1	104	74	66	31		27	45	71	9	27	0.42	0.71	0.26	p	0.63	0.33
Keswick	Keswick	BM	Newnham College	2A03/24.2	214	97	94	45		84	60	95	19	44	0.46	0.45	0.39	o	0.63	0.43
Keswick	Keswick	BM	Newnham College	2A03/24.3	191	125	125	49		111	99	108	21	41	0.39	0.65	0.58	c	0.92	0.51

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Keswick	2A03.21.4	F	slightly rolled	80	f	0	0	n	2	1.72									
Keswick	2A03/18.1	FG	slightly rolled	89	f	0	0	n	2	2.91									
Keswick	2A03/18.2	HK	slightly rolled	61	f	0	0	n	2	2.67									
Keswick	2A03/18.3	FG	slightly rolled	83	p	0	10	b	0	3.64									
Keswick	2A03/19.1	H	slightly rolled	72	p	1	5	b	2	2.82									x
Keswick	2A03/19.2	F	slightly rolled	71	f	0	0	n	2	4.29				x					
Keswick	2A03/19.3	F	slightly rolled	73	p	0	5	b	2	2.51									
Keswick	2A03/20.1	F	rolled	49	p	0	15	b	0	5.06									
Keswick	2A03/20.3	H	rolled	45	p	0	10	a	2	5.09									
Keswick	2A03/20.4	GK	slightly rolled	51	f	0	0	n	2	3.99									
Keswick	2A03/20.5	M	slightly rolled	59	f	0	0	n	2	2.79			x						
Keswick	2A03/21.1	K	rolled	67	f	0	10	m	0	4									
Keswick	2A03/21.2	H	slightly rolled	43	f	1	0	n	2	4.93									
Keswick	2A03/21.3	H	slightly rolled	34	f	0	0	n	1	8.24									
Keswick	2A03/22.1	F	slightly rolled	48	f	0	5	b	2	2.87		x							
Keswick	2A03/22.2	J	rolled	54	f	1	0	n	2						x				
Keswick	2A03/22.3	GK	rolled	58	f	0	0	n	2	1.64		x			x			x	
Keswick	2A03/22.4	M	rolled	46	p	0	10	b	0	8.66	x		x						
Keswick	2A03/23.1	HK	slightly rolled	49	u	1	20	b	0	1.54									
Keswick	2A03/23.2	FG	slightly rolled	56	f	0	0	n	1	3.61									
Keswick	2A03/23.3	F	slightly rolled	50	p	0	5	m	2	5.14									

Keswick	2A03/23.4	GJ	very rolled	59	p	0	5	b	2	2.14
Keswick	2A03/24.1	HK	very fresh	48	f	0	5	m	2	2.3
Keswick	2A03/24.2	F	slightly rolled	71	p	0	5	b	2	2.69
Keswick	2A03/24.3	H	slightly rolled	75	f	1	10	m	2	1.66

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Lent Rise	Lent Rise	BM	Wellcome	1B10/10.1	107	47	47	37	171	22	26	46	15	21	0.79	0.44	0.21	P	0.57	0.71
Lent Rise	Lent Rise	BM	Wellcome	1B10/10.2	94	73	69	42	244	37	35	58	17	25	0.58	0.78	0.39	O	0.60	0.68
Lent Rise	Lent Rise	BM	Wellcome	1B10/10.3	86	43	38	27	91	27	20	38	9	26	0.63	0.50	0.31	P	0.53	0.35
Lent Rise	Lent Rise	BM	Wellcome	1B10/10.4	113	82	73	35	336	37	44	70	14	29	0.43	0.73	0.33	P	0.63	0.48
Lent Rise	Lent Rise	BM	Wellcome	1B10/10.5	87	60	59	26	150	37	45	52	16	18	0.43	0.69	0.43	O	0.87	0.89
Lent Rise	Lent Rise	BM	Wellcome	1B10/10.6	87	41	34	31	104	20	21	40	11	31	0.76	0.47	0.23	P	0.53	0.35
Lent Rise	Lent Rise	BM	Wellcome	1B10/10.7	122	90	69	62	593	23	32	85	26	50	0.69	0.74	0.19	P	0.38	0.52
Lent Rise	Lent Rise	BM	Wellcome	1B10/10.8	85	35	30	27	67	31	23	34	7	27	0.77	0.41	0.36	O	0.68	0.26
Lent Rise	Lent Rise	BM	Wellcome	1B10/10.9	105	61	60	30	197	41	34	56	14	27	0.49	0.58	0.39	O	0.61	0.52
Lent Rise	Lent Rise	BM	Wellcome	1B10/11.1	136	69	68	41	450	71	52	49	21	40	0.59	0.51	0.52	O	1.06	0.53
Lent Rise	Lent Rise	BM	Wellcome	1B10/11.2	119	77	65	45	342	37	37	76	12	44	0.58	0.65	0.31	P	0.49	0.27
Lent Rise	Lent Rise	BM	Wellcome	1B10/11.3	127	66	60	43	313	33	35	59	18	40	0.65	0.52	0.26	P	0.59	0.45
Lent Rise	Lent Rise	BM	Wellcome	1B10/11.4	79	51	47	35	144	28	31	50	16	31	0.69	0.65	0.35	O	0.62	0.52
Lent Rise	Lent Rise	BM	Wellcome	1B10/11.5	100	59	48	32	233	38	29	49	16	28	0.54	0.59	0.38	O	0.59	0.57
Lent Rise	Lent Rise	BM	Wellcome	1B10/11.6	110	60	56	39	277	37	42	54	18	33	0.65	0.55	0.34	P	0.78	0.55
Lent Rise	Lent Rise	BM	Wellcome	1B10/11.7	86	55	53	27	122	30	36	49	14	15	0.49	0.64	0.35	O	0.73	0.93
Lent Rise	Lent Rise	BM	Wellcome	1B10/11.8	79	49	42	31	93	20	21	48	11	31	0.63	0.62	0.25	P	0.44	0.35
Lent Rise	Lent Rise	BM	Wellcome	1B10/11.9	99	61	60	40	176	32	34	47	20	28	0.66	0.62	0.32	P	0.72	0.71
Lent Rise	Lent Rise	BM	Wellcome	1B10/12.1	123	72	59	23	213	43	36	64	13	18	0.32	0.59	0.35	O	0.56	0.72
Lent Rise	Lent Rise	BM	Wellcome	1B10/12.2	168	87	77	46	520	60	49	63	19	46	0.53	0.52	0.36	O	0.78	0.41

Lent Rise	Lent Rise	BM	Wellcome	1B10/12.3	79	53	50	25	100	17	33	51	10	22	0.47	0.67		0.22	P	0.65	0.45
Lent Rise	Lent Rise	BM	Wellcome	1B10/12.4	91	53	46	38	169	25	24	52	19	33	0.72	0.58		0.27	P	0.46	0.58
Lent Rise	Lent Rise	BM	Wellcome	1B10/12.5	124	75	65	39	315	40	38	71	15	35	0.52	0.60		0.32	P	0.54	0.43
Lent Rise	Lent Rise	BM	Wellcome	1B10/12.6	90	70	70	35	210	46	31	61	14	28	0.50	0.78		0.51	O	0.51	0.50
Lent Rise	Lent Rise	BM	Wellcome	1B10/12.7	107	67	62	34	247	27	38	65	17	28	0.51	0.63		0.25	P	0.58	0.61
Lent Rise	Lent Rise	BM	Wellcome	1B10/13.1	94	81	78	46	342	56	72	70	22	37	0.57	0.86		0.60	C	1.03	0.59
Lent Rise	Lent Rise	BM	Wellcome	1B10/13.2	104	59	51	45	289	37	32	58	17	49	0.76	0.57		0.36	O	0.55	0.35
Lent Rise	Lent Rise	BM	Wellcome	1B10/13.3	82	58	57	36	152	44	45	43	10	32	0.62	0.71		0.54	O	1.05	0.31
Lent Rise	Lent Rise	BM	Wellcome	1B10/13.4	99	85	64	34	224	12	34	81	18	25	0.40	0.86		0.12	P	0.42	0.72
Lent Rise	Lent Rise	BM	Wellcome	1B10/13.5	124	91	82	39	404	46	48	64	21	31	0.43	0.73		0.37	O	0.75	0.68
Lent Rise	Lent Rise	BM	Wellcome	1B10/13.6	110	71	69	42	303	43	47	65	15	36	0.59	0.65		0.39	O	0.72	0.42
Lent Rise	Lent Rise	BM	Wellcome	1B10/14.1	119	83	80	32	300	49	55	64	11	27	0.39	0.70		0.41	O	0.86	0.41
Lent Rise	Lent Rise	BM	Wellcome	1B10/14.2	149	82	50	49	456	35	38	81	19	43	0.60	0.55		0.23	P	0.47	0.44
Lent Rise	Lent Rise	BM	Wellcome	1B10/14.3	131	79	79	44	449	63	56	57	20	34	0.56	0.60		0.48	O	0.98	0.59
Lent Rise	Lent Rise	BM	Wellcome	1B10/14.4	117	70	69	31	218	43	37	55	12	21	0.44	0.60		0.37	O	0.67	0.57
Lent Rise	Lent Rise	BM	Wellcome	1B10/14.5	89	60	55	23	114	37	27	53	10	22	0.38	0.67		0.42	O	0.51	0.45
Lent Rise	Lent Rise	BM	Wellcome	1B10/14.6	100	72	71	40	298	55	53	61	17	32	0.56	0.72		0.55	C	0.87	0.53
Lent Rise	Lent Rise	BM	Wellcome	1B10/14.7	90	57	54	20	119	29	35	55	10	19	0.35	0.63		0.32	P	0.64	0.53
Lent Rise	Lent Rise	BM	Wellcome	1B10/15.1	107	58	56	39	225	50	26	52	16	30	0.67	0.54		0.47	O	0.50	0.53
Lent Rise	Lent Rise	BM	Wellcome	1B10/15.2	71	53	49	27	102	23	29	50	14	26	0.51	0.75		0.32	P	0.58	0.54
Lent Rise	Lent Rise	BM	Wellcome	1B10/15.3	104	77	62	38	292	24	35	71	29	30	0.49	0.74		0.23	P	0.49	0.97
Lent Rise	Lent Rise	BM	Wellcome	1B10/15.4	137	74	72	48	418	54	43	63	17	44	0.65	0.54		0.39	O	0.68	0.39
Lent Rise	Lent Rise	BM	Wellcome	1B10/15.5	86	56	56	26	141	46	41	43	19	16	0.46	0.65		0.53	O	0.95	1.19

Lent Rise	Lent Rise	BM	Wellcome	1B10/15.6	116	64	54	43	296	44	35	53	14	37	0.67	0.55		0.38	P	0.66	0.38
Lent Rise	Lent Rise	BM	Wellcome	1B10/15.7	116	48	48	42	190	58	36	45	11	27	0.88	0.41		0.50	O	0.80	0.41
Lent Rise	Lent Rise	BM	Wellcome	1B10/15.8	101	72	67	37	261	21	48	71	12	32	0.51	0.71		0.21	P	0.68	0.38
Lent Rise	Lent Rise	BM	Wellcome	1B10/15.9	88	55	30	37	115	16	22	54	11	37	0.67	0.63		0.18	P	0.41	0.30
Lent Rise	Lent Rise	BM	Wellcome	1B10/16.1	96	63	62	35	252	34	54	59	14	34	0.56	0.66		0.35	O	0.92	0.41
Lent Rise	Lent Rise	BM	Wellcome	1B10/16.2	113	60	59	45	320	54	47	47	15	36	0.75	0.53		0.48	O	1.00	0.42
Lent Rise	Lent Rise	BM	Wellcome	1B10/16.3	118	77	54	33	288	79	63	51	20	25	0.43	0.65		0.67	C	1.24	0.80
Lent Rise	Lent Rise	BM	Wellcome	1B10/16.4	88	58	58	38	189	43	50	54	11	36	0.66	0.66		0.49	O	0.93	0.31
Lent Rise	Lent Rise	BM	Wellcome	1B10/16.5	120	71	66	50	289	49	48	41	22	38	0.70	0.59		0.41	O	1.17	0.58
Lent Rise	Lent Rise	BM	Wellcome	1B10/16.6	92	67	66	42	239	42	39	56	21	25	0.63	0.73		0.46	O	0.70	0.84
Lent Rise	Lent Rise	BM	Wellcome	1B10/16.7	150	82	50	42	468	19	35	79	21	40	0.51	0.55		0.13	P	0.44	0.53
Lent Rise	Lent Rise	BM	Wellcome	1B10/16.8	102	69	67	30	267	56	64	63	20	22	0.43	0.68		0.55	C	1.02	0.91
Lent Rise	Lent Rise	BM	Wellcome	1B10/17.1	143	82	62	26	296	24	32	81	15	15	0.32	0.57		0.17	P	0.40	1.00
Lent Rise	Lent Rise	BM	Wellcome	1B10/17.2	149	72	66	32	302	55	43	47	16	27	0.44	0.48		0.37	O	0.91	0.59
Lent Rise	Lent Rise	BM	Wellcome	1B10/17.3	69	53	39	21	76	13	20	52	9	19	0.40	0.77		0.19	P	0.38	0.47
Lent Rise	Lent Rise	BM	Wellcome	1B10/17.4	136	78	73	44	491	38	66	71	18	25	0.56	0.57		0.28	P	0.93	0.72
Lent Rise	Lent Rise	BM	Wellcome	1B10/17.5	96	60	59	46	218	45	39	46	15	33	0.77	0.63		0.47	O	0.85	0.45
Lent Rise	Lent Rise	BM	Wellcome	1B10/17.6	117	64	61	37	291	46	42	60	16	30	0.58	0.55		0.39	O	0.70	0.53
Lent Rise	Lent Rise	BM	Wellcome	1B10/18.1	115	71	63	30	276	14	39	70	24	27	0.42	0.62		0.12	P	0.56	0.89
Lent Rise	Lent Rise	BM	Wellcome	1B10/18.2	79	54	44	31	107	27	27	46	15	14	0.57	0.68		0.34	P	0.59	1.07
Lent Rise	Lent Rise	BM	Wellcome	1B10/18.3	172	84	66	61	575	49	41	76	19	53	0.73	0.49		0.28	P	0.54	0.36
Lent Rise	Lent Rise	BM	Wellcome	1B10/18.4	110	58	55	42	289	37	31	39	27	33	0.72	0.53		0.34	P	0.79	0.82
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/5.1	87	52	41	32	128	35	19	44	11	31	0.62	0.60		0.40	O	0.43	0.35

Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/5.2	80	45	42	32	100	27	30	43	11	24	0.71	0.56	0.34	P	0.70	0.46
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/5.3	128	65	58	32	226	54	40	37	13	27	0.49	0.51	0.42	O	1.08	0.48
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/5.4	107	51	42	30	142	21	26	49	14	28	0.59	0.48	0.20	P	0.53	0.50
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/5.5	121	86	84	34	409	63	77	67	16	26	0.40	0.71	0.52	O	1.15	0.62
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/5.6	105	70	66	46	305	37	39	65	24	41	0.66	0.67	0.35	O	0.60	0.59
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/7.1	97	57	47	30	132	17	21	56	7	25	0.53	0.59	0.18	P	0.38	0.28
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/7.2	113	96	92	47	510	30	71	94	20	47	0.49	0.85	0.27	P	0.76	0.43
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/7.3	72	83	68	24	130	8	44	81	8	21	0.29	1.15	0.11	P	0.54	0.38
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/7.4	66	42	35	18	52	0	21	38	12	17	0.43	0.64	0.00	P	0.55	0.71
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/7.5	81	69	65	37	212	32	46	54	18	35	0.54	0.85	0.40	O	0.85	0.51
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/7.6	106	50	29	45	142	20	19	46	10	43	0.90	0.47	0.19	P	0.41	0.23
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/7.7	117	54	48	30	173	38	24	46	8	26	0.56	0.46	0.32	P	0.52	0.31
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/7.8	81	46	44	17	58	33	24	44	8	16	0.37	0.57	0.41	O	0.55	0.50
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/8.1	146	79	56	34	355	25	37	79	15	32	0.43	0.54	0.17	P	0.47	0.47
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/8.2	131	51	50	24	167	63	30	50	10	21	0.47	0.39	0.48	O	0.60	0.48
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/8.3	134	86	70	56	558	15	49	84	24	39	0.65	0.64	0.11	P	0.58	0.62
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/8.4	142	94	92	52	804	43	72	85	29	36	0.55	0.66	0.30	P	0.85	0.81
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/9.1	125	78	60	56	428	27	39	79	20	34	0.72	Condition+X2:AD	0.22	P	0.49	0.59
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/9.2	114	72	65	41	324	31	42	70	22	32	0.57	0.63	0.27	P	0.60	0.69
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/9.3	119	66	55	37	211	24	33	66	15	33	0.56	0.55	0.20	P	0.50	0.45
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/9.4	107	64	64	39	281	47	49	54	19	34	0.61	0.60	0.44	O	0.91	0.56
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B10/9.5	124	78	73	40	397	69	64	65	18	29	0.51	0.63	0.56	C	0.98	0.62
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B8/8.2	129	93	92	38	481	57	64	67	25	33	0.41	0.72	0.44	O	0.96	0.76

Lent Rise	Lent Rise	BM	A.D. Lacaille	1B8/8.3	107	78	57	35	241	21	36	77	14	32	0.45	0.73		0.20	P	0.47	0.44
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B8/8.4	135	74	71	33	299	37	49	69	18	20	0.45	0.55		0.27	P	0.71	0.90
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/14.1	88	55	54	28	141	50	35	39	13	29	0.51	0.63		0.57	C	0.90	0.45
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/14.2	162	88	83	53	611	67	55	76	19	33	0.60	0.54		0.41	O	0.72	0.58
Lent Rise	Stomp Road	BM	A.D. Lacaille	1B9/14.3	130	91	90	47	536	64	49	77	25	41	0.52	0.70		0.49	O	0.64	0.61
Lent Rise	Lent Rise	BM	A. Marshall	1B9/22.1	164	81	69	45	440	48	36	73	16	41	0.56	0.49		0.29	P	0.49	0.39
Lent Rise	Lent Rise	BM	A. Marshall	1B9/22.2	145	82	67	44	411	30	38	83	12	43	0.54	0.57		0.21	P	0.46	0.28
Lent Rise	Lent Rise	BM	A. Marshall	1B9/22.3	147	96	90	50	617	44	54	83	20	42	0.52	0.65		0.30	P	0.65	0.48
Lent Rise	Lent Rise	BM	A. Marshall	1B9/22.4	155	76	52	41	364	33	29	77	11	36	0.54	0.49		0.21	P	0.38	0.31
Lent Rise	Lent Rise	BM	A. Marshall	1B9/23.1	123	69	68	30	268	75	25	53	17	26	0.43	0.56		0.61	C	0.47	0.65
Lent Rise	Lent Rise	BM	A. Marshall	1B9/23.2	120	61	59	39	247	57	41	44	14	32	0.64	0.51		0.48	O	0.93	0.44
Lent Rise	Lent Rise	BM	A. Marshall	1B9/23.3	105	58	57	25	184	52	40	49	15	21	0.43	0.55		0.50	O	0.82	0.71
Lent Rise	Lent Rise	BM	A. Marshall	1B9/23.4	123	70	69	36	302	37	43	58	15	31	0.51	0.57		0.30	P	0.74	0.48
Lent Rise	Lent Rise	BM	A. Marshall	1B9/23.5	138	80	63	33	323	33	41	75	14	27	0.41	0.58		0.24	P	0.55	0.52
Lent Rise	Lent Rise	BM	A. Marshall	1B9/23.6	86	61	54	35	163	21	35	58	16	26	0.57	0.71		0.24	P	0.60	0.62
Lent Rise	Lent Rise	BM	A. Marshall	1B9/23.7	136	78	70	40	461	80	62	63	21	31	0.51	0.57		0.59	C	0.98	0.68
Lent Rise	Lent Rise	BM	A. Marshall	1B9/24.1	115	51	41	27	155	26	25	51	13	20	0.53	0.44		0.23	P	0.49	0.65
Lent Rise	Lent Rise	BM	A. Marshall	1B9/24.2	142	82	56	36	329	31	30	77	14	30	0.44	0.58		0.22	P	0.39	0.47
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/3.1	83	54	53	38	166	39	44	50	13	33	0.70	0.65		0.47	O	0.88	0.39
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/3.2	125	80	78	30	337	27	39	77	16	29	0.38	0.64		0.22	P	0.51	0.55
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/3.3	131	112	85	58	841	93	105	62	31	40	0.52	0.85		0.71	C	1.69	0.78
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/3.4	88	55	54	25	124	48	48	46	10	17	0.45	0.63		0.55	C	1.04	0.59
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/6.1	119	68	62	31	240	37	36	60	11	28	0.46	0.57		0.31	P	0.60	0.39

Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/6.2	90	64	54	33	138	26	28	58	13	22	0.52	0.71		0.29	P	0.48	0.59
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/6.3	117	69	63	39	297	43	32	66	22	38	0.57	0.59		0.37	O	0.48	0.58
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/6.4	129	58	58	49	310	60	35	38	15	46	0.84	0.45		0.47	O	0.92	0.33
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/6.5	118	52	51	40	227	56	32	50	13	40	0.77	0.44		0.47	O	0.64	0.33
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/7.1	78	46	36	23	71	16	16	44	10	17	0.50	0.59		0.21	P	0.36	0.59
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/7.2	116	78	69	44	310	26	38	77	18	26	0.56	0.67		0.22	P	0.49	0.69
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/7.3	76	47	46	30	131	42	33	40	17	27	0.64	0.62		0.55	C	0.83	0.63
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/7.4	119	53	40	33	153	28	23	50	7	26	0.62	0.45		0.24	P	0.46	0.27
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/7.5	84	70	53	28	131	8	26	69	6	28	0.40	0.83		0.10	P	0.38	0.21
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/7.6	113	73	70	34	305	42	46	64	18	28	0.47	0.65		0.37	O	0.72	0.64
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/7.7	110	78	69	33	272	31	41	73	10	23	0.42	0.71		0.28	P	0.56	0.43
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/7.8	94	56	50	31	123	27	30	46	10	28	0.55	0.60		0.29	P	0.65	0.36
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/7.9	100	57	41	38	181	9	17	57	11	33	0.67	0.57		0.09	P	0.30	0.33
Lent Rise	Lent Rise	BM	A.D. Lacaille	1B9/8.1	119	89	88	51	560	53	73	76	17	51	0.57	0.75		0.45	O	0.96	0.33

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Lent Rise	1B10/10.1	DF	slightly rolled	24	p	0	50	a	0	6.97						x			
Lent Rise	1B10/10.2	FM	very rolled	18	f	0	0	n	2	7.79									x
Lent Rise	1B10/10.3	E	very fresh	36	f	0	0	n	2	4.95	x								
Lent Rise	1B10/10.4	G	slightly rolled	26	p	0	45	a	0	3.54						x			
Lent Rise	1B10/10.5	K	very rolled	27	f	0	0	n	2	3.14									
Lent Rise	1B10/10.6	FM	slightly rolled	26	f	0	0	n	2	7.32									x
Lent Rise	1B10/10.7	D	rolled	26	u	0	80	a	0	10.38									
Lent Rise	1B10/10.8	E	slightly rolled	17	f	0	0	n	2	9.07									
Lent Rise	1B10/10.9	FG	very rolled	22	p	0	10	a	0	3.7							x		
Lent Rise	1B10/11.1	HK	very rolled	31	p	0	10	b	2	5.14						x			
Lent Rise	1B10/11.2	DF	very fresh	25	p	0	10	b	2	14.28	x								
Lent Rise	1B10/11.3	F	slightly rolled	20	p	0	50	a	0	3.72	x					x			
Lent Rise	1B10/11.4	E	slightly rolled	17	p	0	5	b	2	4.61	x								
Lent Rise	1B10/11.5	DF	slightly rolled	23	p	1	30	a	2	6.18									
Lent Rise	1B10/11.6	GK	rolled	22	f	0	0	n	2	8.6	x							x	
Lent Rise	1B10/11.7	K	very rolled	29	f	0	0	n	1	4.13	x								
Lent Rise	1B10/11.8	J	slightly rolled	32	f	0	0	n	2	3.58	x			x					
Lent Rise	1B10/11.9	G	slightly rolled	21	f	0	25	m	2	2.38				x					
Lent Rise	1B10/12.1	F	slightly rolled	21	f	0	0	n	2	5									x
Lent Rise	1B10/12.2	DF	rolled	30	u	0	15	b	0	6.07								x	

Lent Rise	1B10/12.3	F	very fresh	34	f	0	10	m	2	3.95									x
Lent Rise	1B10/12.4	DF	rolled	25	u	0	20	b	0	5.29	x								
Lent Rise	1B10/12.5	G	slightly rolled	25	f	0	0	n	2	2.71									
Lent Rise	1B10/12.6	E	slightly rolled	42	p	0	20	b	2	5.6							x		
Lent Rise	1B10/12.7	E	slightly rolled	29	f	0	0	n	0	5.69									
Lent Rise	1B10/13.1	H	slightly rolled	30	f	1	0	n	2	5.73									
Lent Rise	1B10/13.2	DF	very rolled	42	p	0	35	b	2	3.89						x			
Lent Rise	1B10/13.3	E	slightly rolled	23	f	1	0	n	2	3.71									
Lent Rise	1B10/13.4	DF	very fresh	29	p	0	5	b	2	4.56			x						
Lent Rise	1B10/13.5	DK	slightly rolled	24	p	0	40	b	0	4.72									
Lent Rise	1B10/13.6	HK	rolled	21	f	0	20	m	2	4.38								x	
Lent Rise	1B10/14.1	GH	slightly rolled	33	p	0	10	a	2	5.38									
Lent Rise	1B10/14.2	M	rolled	27	p	0	5	b	2	5.65									x
Lent Rise	1B10/14.3	DK	rolled	42	p	0	15	a	2	4.79						x			
Lent Rise	1B10/14.4	F	very fresh	46	p	0	25	a	2	5.16						x	x		
Lent Rise	1B10/14.5	EF	rolled	29	u	0	30	b	0	4.52							x		
Lent Rise	1B10/14.6	E	very rolled	27	p	0	10	b	2	5.2									
Lent Rise	1B10/14.7	F	slightly rolled	29	f	0	0	n	2	5.92									
Lent Rise	1B10/15.1	DF	slightly rolled	29	u	0	60	b	0	10.74	x					x			
Lent Rise	1B10/15.2	J	very fresh	20	p	0	25	m	2	4.84									
Lent Rise	1B10/15.3	D	slightly rolled	30	p	0	5	b	2	5.85									
Lent Rise	1B10/15.4	F	slightly rolled	24	f	0	10	a	0	6.54	x							x	
Lent Rise	1B10/15.5	E	very rolled	34	f	0	0	n	2	9.72									

Lent Rise	1B10/15.6	DF	slightly rolled	46	p	0	20	a	0	3.94		x		x					
Lent Rise	1B10/15.7	L	rolled	29	f	0	5	a	0	7.2									
Lent Rise	1B10/15.8	H	slightly rolled	32	p	0	5	b	2	4									
Lent Rise	1B10/15.9	EF	slightly rolled	26	u	0	70	b	0	4.57		x				x			
Lent Rise	1B10/16.1	H	slightly rolled	20	u	1	50	a	0	4.61						x			
Lent Rise	1B10/16.2	DK	rolled	27	p	0	50	a	0	2.85									
Lent Rise	1B10/16.3	H	slightly rolled	38	p	0	30	a	0	6.19						x		x	
Lent Rise	1B10/16.4	H	slightly rolled	43	f	0	0	n	2	4.76									
Lent Rise	1B10/16.5	D	very rolled	28	u	0	45	b	0	7.7								x	
Lent Rise	1B10/16.6	E	slightly rolled	20	f	0	0	n	1	5.98	x								
Lent Rise	1B10/16.7	L	rolled	33	p	0	15	a	0	5.94						x			
Lent Rise	1B10/16.8	H	very rolled	32	f	0	5	m	2	7.7									
Lent Rise	1B10/17.1	F	slightly rolled	25	p	0	20	b	1	4.15									
Lent Rise	1B10/17.2	F	slightly rolled	22	f	0	5	m	1	8.6									x
Lent Rise	1B10/17.3	EF	rolled	27	f	0	0	n	2	3.44									
Lent Rise	1B10/17.4	H	very rolled	27	u	0	50	a	0	5.55						x			
Lent Rise	1B10/17.5	E	very fresh	26	p	0	25	b	0	5.18		x							
Lent Rise	1B10/17.6	DK	slightly rolled	21	f	0	0	n	2	5.91									
Lent Rise	1B10/18.1	D	very rolled	33	f	0	0	n	2	9.14									
Lent Rise	1B10/18.2	E	very rolled	25	f	0	0	n	2	4.29	x								
Lent Rise	1B10/18.3	DF	very fresh	15	f	0	15	m	0	10.71		x				x			
Lent Rise	1B10/18.4	D	rolled	14	p	0	30	a	2	4.29									
Lent Rise	1B10/5.1	EF	very fresh	12	p	0	55	b	0	3.5			x						

Lent Rise	1B10/5.2	E	very fresh	20	f	0	0	n	2	5.65		x							
Lent Rise	1B10/5.3	F	very fresh	22	u	0	50	b	0	8.77	x					x			
Lent Rise	1B10/5.4	F	slightly rolled	27	p	0	45	b	2	3.48						x			
Lent Rise	1B10/5.5	H	very fresh	23	f	1	5	m	2	4.21						x			
Lent Rise	1B10/5.6	D	very rolled	43	f	0	0	n	2	6.33	x								
Lent Rise	1B10/7.1	F	very fresh		p	0	5	b	2	6.84	x								
Lent Rise	1B10/7.2	H	rolled	40	f	0	0	n	2	13.25									x
Lent Rise	1B10/7.3	G	very fresh	41	f	0	0	n	2	2.66									x
Lent Rise	1B10/7.4	M	very fresh	25	f	0	0	n	2	2.29									x
Lent Rise	1B10/7.5	E	very rolled	21	f	0	0	n	2	8.07									
Lent Rise	1B10/7.6	DF	very fresh	26	f	0	10	m	2	4.9			x						
Lent Rise	1B10/7.7	F	very fresh	22	p	0	15	b	2	7.3									
Lent Rise	1B10/7.8	EF	very fresh	25	f	0	5	m	1	4.32									
Lent Rise	1B10/8.1	F	rolled	23	f	0	0	n	2	5.58									x
Lent Rise	1B10/8.2	F	very rolled	43	p	0	25	b	2	6.8									x
Lent Rise	1B10/8.3	D	slightly rolled	24	f	0	0	n	2	6.16									x
Lent Rise	1B10/8.4	F	slightly rolled	35	f	0	0	n	2	5.3									x
Lent Rise	1B10/9.1	FM	slightly rolled	47	p	0	10	b	2	4.96				x					x
Lent Rise	1B10/9.2	F	very rolled	40	f	0	0	n	2	4.47									x
Lent Rise	1B10/9.3	FM	slightly rolled	36	f	0	0	n	2	7.49				x					x
Lent Rise	1B10/9.4	DK	very rolled	38	f	0	5	m	0	4.12									
Lent Rise	1B10/9.5	H	rolled	34	p	0	20	a	2	6.46									
Lent Rise	1B8/8.2	GH	very fresh	37	f	0	0	n	2	4.44									

Lent Rise	1B8/8.3	FM	slightly rolled	38	f	0	0	n	2	3.28			x						x
Lent Rise	1B8/8.4	H	very fresh	27	f	0	0	n	2	6.98						x			
Lent Rise	1B9/14.1	DK	slightly rolled	26	u	0	40	a	0	4.03	x					x			
Lent Rise	1B9/14.2	G	rolled	23	f	0	0	n	2	3.48				x				x	
Lent Rise	1B9/14.3	G	slightly rolled	42	f	0	0	n	2	4.91									
Lent Rise	1B9/22.1	F	slightly rolled	34	f	0	5	a	2	3.5									
Lent Rise	1B9/22.2	F	slightly rolled	44	f	0	0	n	2	3.82									
Lent Rise	1B9/22.3	G	rolled	39	p	0	5	b	0	3.93									
Lent Rise	1B9/22.4	FM	slightly rolled	36	u	0	25	b	0	6.92			x						
Lent Rise	1B9/23.1	HK	rolled	38	p	0	10	a	2	4.78									
Lent Rise	1B9/23.2	F	slightly rolled	39	u	0	45	b	0	10.29	x					x			
Lent Rise	1B9/23.3	G	very rolled	30	f	0	5	m	2	6.12	x								
Lent Rise	1B9/23.4	DF	slightly rolled	37	u	0	55	b	0	6.66						x			
Lent Rise	1B9/23.5	FM	slightly rolled	25	f	0	5	m	2	6.85			x						
Lent Rise	1B9/23.6	GJ	slightly rolled	27	f	0	0	n	2	4.15									
Lent Rise	1B9/23.7	H	rolled	27	f	1	20	a	0	5.88						x			
Lent Rise	1B9/24.1	F	slightly rolled	37	p	0	10	b	2	6.3	x			x		x			
Lent Rise	1B9/24.2	F	very rolled	27	u	0	10	b	2	4.23									
Lent Rise	1B9/3.1	E	slightly rolled		p	0	20	b	2	7.5									
Lent Rise	1B9/3.2	M	slightly rolled		p	0	35	b	0	7.16			x						
Lent Rise	1B9/3.3	D	slightly rolled		u	0	70	a	0	7.72						x			
Lent Rise	1B9/3.4	K	rolled		u	0	15	b	0	2.54									
Lent Rise	1B9/6.1	FG	slightly rolled		p	0	20	b	2	3.75		x							

Lent Rise	1B9/6.2	E	slightly rolled		f	0	0	n	2	7.33	x								
Lent Rise	1B9/6.3	F	slightly rolled		p	0	10	b	0	5.15				x					
Lent Rise	1B9/6.4	DF	very fresh		u	1	70	b	0	14.43						x			
Lent Rise	1B9/6.5	L	very fresh	16	f	1	25	m	2	6.52						x	x		
Lent Rise	1B9/7.1	E	slightly rolled	25	p	0	25	b	2	7.5									x
Lent Rise	1B9/7.2	D	rolled	18	f	0	0	n	2	5.74									
Lent Rise	1B9/7.3	E	very fresh	32	u	0	65	b	0	6.51						x			
Lent Rise	1B9/7.4	F	slightly rolled	13	p	0	5	b	2	3.43									
Lent Rise	1B9/7.5	F	very fresh	30	p	0	5	b	2	3.11									
Lent Rise	1B9/7.6	G	rolled	21	p	0	5	b	2	4.25									
Lent Rise	1B9/7.7	FG	very fresh	32	u	0	20	b	0	3.07									
Lent Rise	1B9/7.8	F	slightly rolled	34	p	0	5	b	2	4.56									
Lent Rise	1B9/7.9	DF	very fresh	26	u	1	55	b	0	3.28				x					
Lent Rise	1B9/8.1	H	slightly rolled	15	u	0	40	b	2	5.45									

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Leyton	Leytonstone NFP	BM	IOA	1L8/10.1	100	77	76	32	246.8	40	56	69	16	25	0.42	0.77	0.40	O	0.81	0.64
Leyton	Leytonstone	BM	IOA	1L8/10.2	129	93	91	48	580	68	60	85	22	33	0.52	0.72	0.53	O	0.71	0.67
Leyton	Leytonstone	BM	IOA	1L8/10.3	158	96	86	49	606	53	48	66	18	49	0.51	0.61	0.34	P	0.73	0.37
Leyton	Leytonstone	BM	IOA	1L8/10.4	141	106	92	45	696.9	35	61	91	25	35	0.42	0.75	0.25	P	0.67	0.71
Leyton	Leytonstone	BM	IOA	1L8/10.5	137	75	65	40	374.5	30	40	74	12	32	0.53	0.55	0.22	P	0.54	0.38
Leyton	Leytonstone NFP	BM	IOA	1L8/11.1	93	65	49	24	114	22	29	63	13	16	0.37	0.70	0.24	P	0.46	0.81
Leyton	Leytonstone	BM	IOA	1L8/11.2	95	52	49	29	197.8	48	46	53	16	29	0.56	0.55	0.51	O	0.87	0.55
Leyton	Leytonstone	BM	IOA	1L8/11.3	96	77	72	24	183.5	31	39	67	14	18	0.31	0.80	0.32	P	0.58	0.78
Leyton	Leytonstone	BM	IOA	1L8/11.4	131	74	55	37	275.6	35	32	66	13	28	0.50	0.56	0.27	P	0.48	0.46
Leyton	Leytonstone	BM	IOA	1L8/11.5	98	69	68	21	135.8	36	41	65	11	13	0.30	0.70	0.37	O	0.63	0.85
Leyton	Leytonstone	BM	IOA	1L8/11.6	125	89	85	49	634.5	42	72	71	26	34	0.55	0.71	0.34	P	1.01	0.76
Leyton	Leytonstone	BM	IOA	1L8/11.7	88	55	51	39	149.6	29	23	51	12	32	0.71	0.63	0.33	P	0.45	0.38
Leyton	Wentworth Lodge	BM	W.A. Sturge	1L8/12.1	133	96	83	54	617.3	50	64	77	25	45	0.56	0.72	0.38	O	0.83	0.56
Leyton	Wentworth Lodge	BM	A.T. Todd White	1L8/12.2	175	86	71	48	618.5	51	47	73	17	35	0.56	0.49	0.29	P	0.64	0.49
Leyton	Wentworth Lodge	BM	A.T. Todd White	1L8/12.3	75	65	43	36		23	25	64	13	29	0.55	0.87	0.31	P	0.39	0.45
Leyton	Wentworth Lodge	BM	A.T. Todd White	1L8/12.4	111	85	82	40		28	58	77	15	29	0.47	0.77	0.25	P	0.75	0.52
Leyton	Wentworth Lodge	BM	A.T. Todd White	1L8/12.5	133	81	66	35		17	51	79	22	33	0.43	0.61	0.13	P	0.65	0.67
Leyton	Wentworth Lodge	BM	A.T. Todd White	1L8/12.6	119	59	56	40		45	44	57	16	34	0.68	0.50	0.38	O	0.77	0.47
Leyton	Bent's Farm	BM	W.A. Sturge	1L8/13.1	111	75	73	39	345	52	56	63	22	27	0.52	0.68	0.47	O	0.89	0.81
Leyton	Bent's Farm	BM	W.A. Sturge	1L8/13.2	166	85	62	37	416.1	29	34	75	15	30	0.44	0.51	0.17	P	0.45	0.50

Leyton	Leytonstone	BM	W.A. Sturge	1L8/14.1	135	70	61	41	393.9	27	39	70	20	41	0.59	0.52	0.20	P	0.56	0.49
Leyton	Leytonstone	BM	W.A. Sturge	1L8/14.2	175	99	92	35	738.6	55	64	96	23	33	0.35	0.57	0.31	P	0.67	0.70
Leyton	Leytonstone	BM	W.A. Sturge	1L8/14.3	86	64	54	30	161.3	18	36	57	15	24	0.47	0.74	0.21	P	0.63	0.63
Leyton	Leytonstone	BM	W.A. Sturge	1L8/14.4	124	75	59	33	309	24	36	72	18	29	0.44	0.60	0.19	P	0.50	0.62
Leyton	Leytonstone	BM	W.A. Sturge	1L8/14.5	110	82	77	35	315	35	45	74	19	28	0.43	0.75	0.32	P	0.61	0.68
Leyton	Leytonstone	BM	W.A. Sturge	1L8/15.1	95	57	46	31	144.4	21	26	50	16	22	0.54	0.60	0.22	P	0.52	0.73
Leyton	Leytonstone	BM	W.A. Sturge	1L8/15.2	124	91	84	42	413.6	32	42	79	22	33	0.46	0.73	0.26	P	0.53	0.67
Leyton	Leytonstone	BM	W.A. Sturge	1L8/15.3	90	54	51	38	156	34	32	49	11	31	0.70	0.60	0.38	O	0.65	0.35
Leyton	Leytonstone	BM	W.A. Sturge	1L8/15.4	74	63	58	35	138.8	22	34	52	16	28	0.56	0.85	0.30	P	0.65	0.57
Leyton	Leytonstone	BM	W.A. Sturge	1L8/15.5	81	45	40	27	81.7	17	19	45	12	27	0.60	0.56	0.21	P	0.42	0.44
Leyton	Leytonstone	BM	W.A. Sturge	1L8/16.1	121	78	76	41	393	88	77	68	17	34	0.53	0.64	0.73	C	1.13	0.50
Leyton	Leytonstone	BM	W.A. Sturge	1L8/16.2	157	82	66	45	471	39	27	77	19	42	0.55	0.52	0.25	P	0.35	0.45
Leyton	Leytonstone	BM	W.A. Sturge	1L8/16.3	100	60	57	34	225.4	56	49	54	19	28	0.57	0.60	0.56	C	0.91	0.68
Leyton	Leytonstone	BM	W.A. Sturge	1L8/16.4	111	70	69	40	319.5	42	51	58	17	39	0.57	0.63	0.38	O	0.88	0.44
Leyton	Leytonstone	BM	W.A. Sturge	1L8/16.5	109	59	53	36	211.4	31	36	58	12	28	0.61	0.54	0.28	P	0.62	0.43
Leyton	Blake Hall Road	BM	W.A. Sturge	1L8/17.1	107	68	58	41	233.7	19	32	67	14	34	0.60	0.64	0.18	P	0.48	0.41
Leyton	Blake Hall Road	BM	W.A. Sturge	1L8/17.2	117	64	49	37	197.1	33	30	59	12	24	0.58	0.55	0.28	P	0.51	0.50
Leyton	Leytonstone	BM	S.H. Warren	1L8/18.1	61	60	53	27	105.4	16	37	52	22	19	0.45	0.98	0.26	P	0.71	1.16
Leyton	Leytonstone	BM	S.H. Warren	1L8/18.2	113	46	45	27	152.5	66	44	39	15	22	0.59	0.41	0.58	C	1.13	0.68
Leyton	Leytonstone	BM	S.H. Warren	1L8/18.3	107	77	67	25	240	21	57	72	19	19	0.32	0.72	0.20	P	0.79	1.00
Leyton	Leytonstone	BM	S.H. Warren	1L8/18.4	100	51	48	27	141.3	24	39	49	15	18	0.53	0.51	0.24	P	0.80	0.83
Leyton		BM	W.G. Smith	1L8/2.1	69	64	61	21		23	38	54	16	17	0.33	0.93	0.33	P	0.70	0.94
Leyton	Leytonstone	BM	Wellcome	1L8/20.1	119	70	44	41	259.8	22	26	69	10	38	0.59	0.59	0.18	P	0.38	0.26

Leyton	Park Road Leyton	BM	Wellcome	1L8/20.2	131	89	79	33	484.7	33	65	83	26	32	0.37	0.68	0.25	P	0.78	0.81
Leyton	Leytonstone	BM	Wellcome	1L8/20.3	117	90	74	47	421	33	41	75	16	40	0.52	0.77	0.28	P	0.55	0.40
Leyton	Town Hall Leyton	BM	W.A. Sturge	1L8/3.1	125	82	69	44		26	44	78	23	37	0.54	0.66	0.21	P	0.56	0.62
Leyton	Town Hall Leyton	BM	W.A. Sturge	1L8/3.3	126	68	64	26		57	37	51	11	22	0.38	0.54	0.45	O	0.73	0.50
Leyton	St Peter's Cemetery, Leyton	BM	W.A. Sturge	1L8/3.4	122	67	66	34		49	43	58	13	26	0.51	0.55	0.40	O	0.74	0.50
Leyton	Leyton	BM	W.A. Sturge	1L8/3.5	77	46	45	29		26	24	43	12	27	0.63	0.60	0.34	P	0.56	0.44
Leyton	Richmond Road Leyton	BM	A.T. Todd White	1L8/4.1	103	83	80	40		24	58	82	18	27	0.48	0.81	0.23	P	0.71	0.67
Leyton	Twickenham Road, Leytonstone	BM	A.T. Todd White	1L8/4.2	103	73	68	38		37	33	57	18	31	0.52	0.71	0.36	O	0.58	0.58
Leyton	Leytonstone	BM	W.G. Smith	1L8/5.1	101	59	37	26		22	21	55	13	25	0.44	0.58	0.22	P	0.38	0.52
Leyton	Leytonstone	BM	W.G. Smith	1L8/5.2	103	67	61	30		27	26	62	15	29	0.45	0.65	0.26	P	0.42	0.52
Leyton	Leytonstone	BM	W.G. Smith	1L8/5.3	85	61	57	33		29	27	53	12	31	0.54	0.72	0.34	P	0.51	0.39
Leyton	Leytonstone	BM	H. Christie	1L8/6.1	93	63	48	32	157.4	14	25	62	13	29	0.51	0.68	0.15	P	0.40	0.45
Leyton	Leytonstone	BM	H. Christie	1L8/6.2	81	54	50	27	111	30	30	48	12	21	0.50	0.67	0.37	O	0.63	0.57
Leyton	Leytonstone	BM	H. Christie	1L8/6.3	130	65	62	36	340	51	49	57	17	31	0.55	0.50	0.39	O	0.86	0.55
Leyton	Leytonstone	BM	H. Christie	1L8/6.4	165	101	88	44	768.7	43	47	93	22	39	0.44	0.61	0.26	P	0.51	0.56
Leyton	Leytonstone	BM	H. Christie	1L8/6.5	147	82	69	38	438.4	45	44	74	14	35	0.46	0.56	0.31	P	0.59	0.40
Leyton	Leytonstone	BM	IOA	1L8/7.1	75	66	57	32	136.2	13	29	61	14	23	0.48	0.88	0.17	P	0.48	0.61
Leyton	Phillibrook, Leytonstone	BM	IOA	1L8/7.2	83	70	65	23	131	32	33	59	13	17	0.33	0.84	0.39	O	0.56	0.76
Leyton	Leytonstone, by Newline	BM	IOA	1L8/7.3	87	72	69	40	274.4	47	62	60	25	26	0.56	0.83	0.54	O	1.03	0.96
Leyton	Leytonstone	BM	IOA	1L8/7.4	100	71	66	34	206.3	32	43	62	13	25	0.48	0.71	0.32	P	0.69	0.52
Leyton	Birkbeck Estate, Leytonstone	BM	IOA	1L8/7.5	134	68	53	40	311.3	37	36	62	15	39	0.59	0.51	0.28	P	0.58	0.38
Leyton	Leytonstone	BM	IOA	1L8/7.6	91	47	45	30	129.8	20	28	44	11	28	0.64	0.52	0.22	P	0.64	0.39
Leyton	Leytonstone High Level	BM	IOA	1L8/8.1	112	85	84	32	314.3	52	52	73	17	21	0.38	0.76	0.46	O	0.71	0.81

Leyton	Leytonstone High Level	BM	IOA	1L8/8.2	66	44	41	45	128.4	27	27	43	14	45	1.02	0.67	0.41	O	0.63	0.31
Leyton	Leytonstone	BM	IOA	1L8/8.3	112	79	68	43	402.1	23	35	75	20	35	0.54	0.71	0.21	P	0.47	0.57
Leyton	Protheroe's Nursery Leytonstone	BM	IOA	1L8/8.4	70	40	39	22	58.8	28	25	32	10	22	0.55	0.57	0.40	O	0.78	0.45
Leyton	Floor	BM	IOA	1L8/9.1	172	95	83	32	521.3	38	45	81	17	24	0.34	0.55	0.22	P	0.56	0.71
Leyton	Floor	BM	IOA	1L8/9.2	78	64	62	26	155.5	36	54	53	15	18	0.41	0.82	0.46	O	1.02	0.83
Leyton	Floor	BM	IOA	1L8/9.3	90	63	61	37	234.7	41	47	56	16	28	0.59	0.70	0.46	O	0.84	0.57
Leyton		ROM		AD107	92	56	49	37	150.5	24	26	50	10	37	0.66	0.61	0.26	P	0.52	0.27
Leyton	Leyton	ROM	H. Lloyd	AD111	87	47	44	37	120	27	25	40	8	34	0.79	0.54	0.31	P	0.63	0.24
Leyton		ROM	H. Lloyd	AD119	83	51	44	29	109.1	24	21	48	9	27	0.57	0.61	0.29	P	0.44	0.33

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Leyton	1L8/10.1	E	very rolled	22	f	0	0	n	2	11.01									x
Leyton	1L8/10.2	D	rolled	30	p	0	55	a	0	3.64									
Leyton	1L8/10.3	F	very rolled	38	f	0	5	m	2	4.75									
Leyton	1L8/10.4	G	rolled	32	f	0	10	m	0	3.15									
Leyton	1L8/10.5	F	very rolled	34	f	0	5	m	2	2.36									
Leyton	1L8/11.1	E	rolled	21	f	0	15	m	0	6.83			x						
Leyton	1L8/11.2	E	very rolled	16	f	0	0	n	2	8.03									
Leyton	1L8/11.3	J	slightly rolled	36	f	0	0	n	2	3.03							x		
Leyton	1L8/11.4	F	very rolled	32	f	0	0	n	2	3.01				x					
Leyton	1L8/11.5	J	very rolled	25	f	1	0	n	2	3.87									
Leyton	1L8/11.6	H	very rolled	26	p	1	30	m	2	5.96									
Leyton	1L8/11.7	EF	slightly rolled	20	p	0	5	b	2	6.53									
Leyton	1L8/12.1	D	very rolled	31	p	0	15	a	0	7.67									x
Leyton	1L8/12.2	E	slightly rolled	45	f	0	10	m	0	3.09									
Leyton	1L8/12.3	F	rolled	19	u	0	25	b	0										
Leyton	1L8/12.4	HK	rolled	33	f	1	5	m	0	3.66									
Leyton	1L8/12.5	D	very rolled	35	f	0	5	m	2	5.08									
Leyton	1L8/12.6	D	very rolled	28	f	0	5	m	0	5.06									
Leyton	1L8/13.1	H	slightly rolled	35	f	0	5	m	2	5.68									
Leyton	1L8/13.2	F	slightly rolled	44	f	0	5	m	2	3.92				x					

Leyton	1L8/14.1	F	slightly rolled	39	f	0	10	m	2	5.34	x						x		
Leyton	1L8/14.2	D	very rolled	36	p	0	15	a	0	5.15									
Leyton	1L8/14.3	EF	very rolled	25	f	0	10	m	2	5.26									x
Leyton	1L8/14.4	F	rolled	29	f	0	0	n	2	2.75									
Leyton	1L8/14.5	GJ	rolled	27	p	0	5	a	1	3.56		x							
Leyton	1L8/15.1	EF	very rolled	21	f	0	30	m	0	5.05							x		
Leyton	1L8/15.2	G	slightly rolled	25	f	0	0	n	2	5.71							x		
Leyton	1L8/15.3	J	very fresh	24	p	0	15	a	2	9.37	x								
Leyton	1L8/15.4	J	slightly rolled	21	f	0	10	m	1	3.91	x								
Leyton	1L8/15.5	EF	rolled	20	f	0	5	m	2	4.4				x					
Leyton	1L8/16.1	H	slightly rolled	26	f	1	10	m	2	6.2									
Leyton	1L8/16.2	FM	rolled	42	f	0	5	m	2	2.95			x						
Leyton	1L8/16.3	HK	rolled	28	f	0	5	m	2	2.64									
Leyton	1L8/16.4	GK	very rolled	19	f	0	15	m	0	4.93	x								
Leyton	1L8/16.5	H	very fresh	31	p	0	10	a	1	3.75									
Leyton	1L8/17.1	F	slightly rolled	30	p	0	5	a	2	5.49									
Leyton	1L8/17.2	DF	very rolled	17	f	0	5	m	0	2.43			x						
Leyton	1L8/18.1	E	very rolled	22	f	0	0	n	2	5.97									
Leyton	1L8/18.2	K	very rolled	24	f	0	10	m	2	3.48									
Leyton	1L8/18.3	D	very rolled	24	f	0	0	n	2	4.1									
Leyton	1L8/18.4	DK	very rolled	24	f	0	0	n	2	5.57									
Leyton	1L8/2.1	E	very rolled	19	f	0	0	n	2										
Leyton	1L8/20.1	FM	slightly rolled	41	f	0	0	n	2	2.99				x					

Leyton	1L8/20.2	H	very rolled	34	f	0	5	m	2	4.23								
Leyton	1L8/20.3	FG	slightly rolled	34	p	0	10	b	0	2.7								
Leyton	1L8/3.1	FG	very rolled	38	p	0	10	a	0	4.04								
Leyton	1L8/3.3	FG	rolled	34	f	0	10	m	1	3.71								x
Leyton	1L8/3.4	FG	slightly rolled	39	p	0	10	a	0	3.05		x						
Leyton	1L8/3.5	E	very rolled	23	f	0	15	m	2	4.15	x							
Leyton	1L8/4.1	H	very rolled	33	f	0	0	n	2	5.25								
Leyton	1L8/4.2	E	very rolled	32	p	0	5	b	2	3.47			x					
Leyton	1L8/5.1	EF	rolled	20	p	0	20	b	2	5.14								
Leyton	1L8/5.2	EF	very rolled	18	p	0	10	a	2	6.58							x	
Leyton	1L8/5.3	E	very rolled	19	u	0	20	b	0	3.91								
Leyton	1L8/6.1	E	very rolled	31	p	0	5	b	2	5.65								
Leyton	1L8/6.2	JK	slightly rolled	29	f	0	0	n	2	2.44					x			
Leyton	1L8/6.3	K	rolled	39	p	1	10	a	2	2.81								x
Leyton	1L8/6.4	FG	slightly rolled	50	f	0	10	m	0	3.06							x	
Leyton	1L8/6.5	FG	rolled	38	p	0	5	a	0	3.65			x					
Leyton	1L8/7.1	E	very rolled	22	f	0	0	n	2	3.01								
Leyton	1L8/7.2	JK	rolled	18	f	1	0	n	2	3.32					x			
Leyton	1L8/7.3	HK	very rolled	29	f	1	0	n	2	3.83								
Leyton	1L8/7.4	J	slightly rolled	30	f	0	5	m	2	2.83								
Leyton	1L8/7.5	DF	rolled	36	p	0	60	a	0	5.23				x		x		
Leyton	1L8/7.6	EF	slightly rolled	29	f	0	5	m	2	5.48						x		x
Leyton	1L8/8.1	K	very rolled	39	f	0	0	n	2	4.78					x			

Leyton	1L8/8.2	E	slightly rolled	16	u	0	25	b	0	3.47							
Leyton	1L8/8.3	FG	very rolled	43	p	0	10	a	2	2.28							
Leyton	1L8/8.4	E	very fresh	18	u	0	20	b	0	2.51							
Leyton	1L8/9.1	F	rolled	45	u	0	55	a	0	4.71							x
Leyton	1L8/9.2	H	very rolled	23	f	0	0	n	2	3.78							
Leyton	1L8/9.3	HK	very rolled	15	u	1	45	b	0	2.57							
Leyton	AD107	F	very fresh	35	p	0	20	b	2	5.14				x			
Leyton	AD111	E	rolled	20	u	0	40	b	0	5.28	x						
Leyton	AD119	J	very fresh	34	f	0	5	m	2	3.29							

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 11.4	82	51	45	33		49	42	45	16	30	0.65	0.62	0.60	c	0.93	0.53
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 17.5	96	52	48	39		58	42	45	14	37	0.75	0.54	0.60	c	0.93	0.38
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 17.1	131	76	74	32		37	49	72	23	24	0.42	0.58	0.28	p	0.68	0.96
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 17.4	129	75	66	48		45	36	58	19	40	0.64	0.58	0.35	o	0.62	0.48
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 9.2	102	67	64	37		39	45	55	15	33	0.55	0.66	0.38	o	0.82	0.45
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 13.7	116	62	53	41		44	25	56	15	39	0.66	0.53	0.38	o	0.45	0.38
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 16.3	112	76	69	48		60	47	58	20	45	0.63	0.68	0.54	o	0.81	0.44
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 15.1	112	62	48	38		38	33	46	14	32	0.61	0.55	0.34	p	0.72	0.44
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 16.5	102	84	68	39		41	45	78	22	31	0.46	0.82	0.40	o	0.58	0.71
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 13.6	74	53	34	25		13	19	52	12	20	0.47	0.72	0.18	p	0.37	0.60
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 15.7	69	52	45	27		12	29	50	14	22	0.52	0.75	0.17	p	0.58	0.64
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 11.1	79	47	29	25		10	17	47	8	24	0.53	0.59	0.13	p	0.36	0.33
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 16.2	76	45	31	26		5	21	44	9	26	0.58	0.59	0.07	p	0.48	0.35
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 18.4	79	48	29	31		28	17	42	11	30	0.65	0.61	0.35	o	0.40	0.37
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 12.2	79	54	48	25		28	29	50	14	22	0.46	0.68	0.35	o	0.58	0.64
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 18.1	79	69	62	47		27	36	68	19	34	0.68	0.87	0.34	p	0.53	0.56
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 16.1	81	56	55	24		32	36	49	12	20	0.43	0.69	0.40	o	0.73	0.60
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 14.7	98	56	44	27		17	22	55	10	23	0.48	0.57	0.17	p	0.40	0.43
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 14.5	82	51	38	26		17	20	50	12	27	0.51	0.62	0.21	p	0.40	0.44
Lower	**Clapton**	BM	Sturge ex W.G. Smith	1K26/ 12.4	85	55	50	24		29	36	50	12	22	0.44	0.65	0.34	p	0.72	0.55

Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 16.4	85	74	60	27		17	31	74	15	22	0.36	0.87	0.20	p	0.42	0.68
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 11.5	86	59	48	29		18	31	53	11	28	0.49	0.69	0.21	p	0.58	0.39
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 17.7	87	56	52	39		36	37	50	14	27	0.70	0.64	0.41	o	0.74	0.52
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 13.5	89	62	56	35		42	33	59	15	22	0.56	0.70	0.47	o	0.56	0.68
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 14.6	89	48	42	34		37	31	37	10	26	0.71	0.54	0.42	o	0.84	0.38
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 15.3	90	69	58	48		35	32	70	13	41	0.70	0.77	0.39	o	0.46	0.32
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 11.2	95	61	55	22		32	40	57	12	22	0.36	0.64	0.34	p	0.70	0.55
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 14.2	97	73	69	29		21	54	72	15	27	0.40	0.75	0.22	p	0.75	0.56
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 9.1	98	67	51	17		21	35	64	12	12	0.25	0.68	0.21	p	0.55	1.00
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 13.1	98	50	43	41		39	24	42	13	38	0.82	0.51	0.40	o	0.57	0.34
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 14.4	99	63	62	35		26	37	63	13	31	0.56	0.64	0.26	p	0.59	0.42
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 17.3	100	57	47	37		25	28	55	13	38	0.65	0.57	0.25	p	0.51	0.34
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 17.6	100	44	38	38		35	27	43	13	38	0.86	0.44	0.35	p	0.63	0.34
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 11.3	102	59	51	29		27	30	55	11	22	0.49	0.58	0.26	p	0.55	0.50
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 13.3	103	66	60	31		41	38	59	12	30	0.47	0.64	0.40	o	0.64	0.40
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 18.3	103	70	68	46		47	52	63	11	45	0.66	0.68	0.46	o	0.83	0.24
Lower Clapton	BM	Sturge ex W.G. Smith	1K26. 11.6	104	52	44	38		23	33	52	16	33	0.73	0.50	0.22	p	0.63	0.48
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 12.3	107	70	53	33		35	27	62	10	25	0.47	0.65	0.33	p	0.44	0.40
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 16.5	113	73	65	25		47	40	69	13	22	0.34	0.65	0.42	o	0.58	0.59
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 15.5	116	58	55	42		45	35	53	16	35	0.72	0.50	0.39	o	0.66	0.46
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 9.3	122	83	72	46		18	52	81	15	45	0.55	0.68	0.15	p	0.64	0.33
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 15.4	125	74	68	44		33	45	71	14	21	0.59	0.59	0.26	p	0.63	0.67
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 15.2	126	73	62	39		49	40	69	15	34	0.53	0.58	0.39	o	0.58	0.44

Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 14.1	97	60	45	41		15	32	58	12	38	0.68	0.62	0.15	p	0.55	0.32
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 17.2	126	83	74	35		33	48	80	15	24	0.42	0.66	0.26	p	0.60	0.63
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 13.4	130	75	73	37		56	56	63	23	29	0.49	0.58	0.43	o	0.89	0.79
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 12.1	140	93	72	40		40	37	89	12	37	0.43	0.66	0.29	p	0.42	0.32
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 14.3	162	85	81	39		56	51	72	15	25	0.46	0.52	0.35	o	0.71	0.60
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 18.2	181	107	105	45		113	96	60	21	35	0.42	0.59	0.62	c	1.60	0.60
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 15.6	96	55	49	21		26	33	55	13	21	0.38	0.57	0.27	p	0.60	0.62
Lower Clapton	BM	Sturge ex W.G. Smith	1K26/ 13.2	91	50	38	23		22	23	49	11	18	0.46	0.55	0.24	p	0.47	0.61

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Lower Clapton	1K26/ 11.4	H	very rolled	19	u	0	50	b	0	5.24						x			
Lower Clapton	1K26/ 17.5	E	rolled	42	p	0	20	m	0	7.96	x					x			
Lower Clapton	1K26/ 17.1	FG	very rolled	51	f	0	0	n	1	5.23									x
Lower Clapton	1K26/ 17.4	FG	very rolled	36	f	0	15	m	0	4.07									x
Lower Clapton	1K26/ 9.2	E	rolled	46	p	0	25	a	0	4.06						x			
Lower Clapton	1K26/ 13.7	EF	rolled	45	p	0	10	b	2	7.01									x
Lower Clapton	1K26/ 16.3	D	very rolled	23	u	1	40	b	0	5.37						x			
Lower Clapton	1K26/ 15.1	F	rolled	42	p	0	5	a	2	6.01								x	x
Lower Clapton	1K26/ 16.5	DF	very rolled	38	p	0	15	a	0	4.4									x
Lower Clapton	1K26/ 13.6	F	rolled	31	p	0	15	b	0	4.28			x						
Lower Clapton	1K26/ 15.7	E	slightly rolled	39	f	0	0	n	2	4.18									
Lower Clapton	1K26/ 11.1	E	rolled	27	f	0	0	n	2	10.88			x						
Lower Clapton	1K26/ 16.2	E	rolled	41	f	0	0	n	2	3.35									
Lower Clapton	1K26/ 18.4	EF	rolled	21	p	0	10	b	2	4.76			x						
Lower Clapton	1K26/ 12.2	E	very rolled	28	p	0	20	m	2	10.8									
Lower Clapton	1K26/ 18.1	E	very rolled	30	p	0	5	b	2	6.81									
Lower Clapton	1K26/ 16.1	K	rolled	51	f	0	0	n	2	4.94									
Lower Clapton	1K26/ 14.7	EF	rolled	47	f	0	0	n	2	5.22									x
Lower Clapton	1K26/ 14.5	E	slightly rolled	46	f	0	0	n	2	3.2							x		
Lower Clapton	1K26/ 12.4	K	very rolled	36	f	0	0	n	2	2.93									

Lower Clapton	1K26/ 16.4	E	very rolled	53	f	0	0	n	2	4.03				
Lower Clapton	1K26/ 11.5	EF	very rolled	38	f	0	0	n	2	2.89				
Lower Clapton	1K26/ 17.7	E	rolled	30	p	0	10	b	0	4.21				
Lower Clapton	1K26/ 13.5	J	slightly rolled	34	f	0	5	m	2	4.36				
Lower Clapton	1K26/ 14.6	E	very rolled	30	f	0	15	b	0	4.24				
Lower Clapton	1K26/ 15.3	E	slightly rolled	42	f	0	10	m	2	6.39				
Lower Clapton	1K26/ 11.2	K	very rolled	30	f	0	0	n	2	6.4				
Lower Clapton	1K26/ 14.2	HK	rolled	46	f	0	0	n	2	3.59				
Lower Clapton	1K26/ 9.1	J	very rolled	47	f	0	0	n	2	3.44				
Lower Clapton	1K26/ 13.1	EF	very rolled	33	f	0	35	m	2	3.76				x
Lower Clapton	1K26/ 14.4	G	very rolled	50	f	0	5	m	2	3.32				
Lower Clapton	1K26/ 17.3	F	very fresh	38	f	0	0	n	2	3.37		x		
Lower Clapton	1K26/ 17.6	DF	slightly rolled	43	p	0	10	b	0	4.74				
Lower Clapton	1K26/ 11.3	DF	rolled	28	p	0	40	a	0	4.79				x
Lower Clapton	1K26/ 13.3	JK	rolled	27	p	0	5	b	2	3.54				
Lower Clapton	1K26/ 18.3	DK	rolled	26	u	0	35	b	0	6.25		x		
Lower Clapton	1K26.1 1.6	D	very rolled	37	p	0	5	b	2	7.61	x			
Lower Clapton	1K26/ 12.3	F	rolled	48	p	0	5	b	2	4.05				
Lower Clapton	1K26/ 16.5	G	slightly rolled	47	f	0	0	n	2	4.16				x
Lower Clapton	1K26/ 15.5	DF	very rolled		p	0	30	b	0	4.89				
Lower Clapton	1K26/ 9.3	G	slightly rolled	43	p	0	15	b	0	2.88		x		
Lower Clapton	1K26/ 15.4	FG	rolled	63	f	0	0	n	2	7.01				
Lower Clapton	1K26/ 15.2	FG	slightly rolled	60	f	0	0	n	2	3.33				

Lower Clapton	1K26/ 14.1	EF	very rolled	39	f	0	0	n	2	5.72	x
Lower Clapton	1K26/ 17.2	G	very rolled	57	f	0	5	m	0	4.69	
Lower Clapton	1K26/ 13.4	DK	very rolled	56	p	0	45	a	0	2.73	
Lower Clapton	1K26/ 12.1	F	rolled	78	f	0	0	n	2	1.99	
Lower Clapton	1K26/ 14.3	G	rolled	83	f	0	0	n	2	2.29	
Lower Clapton	1K26/ 18.2	H	very fresh	44	f	1	10	m	0	6.41	
Lower Clapton	1K26/ 15.6	F	rolled	58	f	0	0	n	2	3.78	x
Lower Clapton	1K26/ 13.2	F	very rolled	32	f	0	10	m	0	4.88	x

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD102	96	51	48	31	114.3	35	25	43	10	28	0.61	0.53	0.26	p	0.58	0.36
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD11	179	105	98	53	770.5	79	72	91	20	41	0.50	0.59	0.40	o	0.79	0.49
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD12	174	110	92	49	890.3	49	57	98	23	49	0.45	0.63	0.33	p	0.58	0.47
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD13	202	97	75	46	774.1	75	43	75	16	44	0.47	0.48	0.21	p	0.57	0.36
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD14	181	90	79	50	911.1	70	42	82	17	48	0.56	0.50	0.23	p	0.51	0.35
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD16	169	88	54	53	497.3	30	32	87	16	51	0.60	0.52	0.19	p	0.37	0.31
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD17	141	90	77	53	511.3	39	41	80	22	32	0.59	0.64	0.29	p	0.51	0.69
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD178	123	89	68	46	417.6	17	45	87	18	35	0.52	0.72	0.37	o	0.52	0.51
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD18	146	71	37	53	405.6	19	20	65	22	46	0.75	0.49	0.14	p	0.31	0.48
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD20	156	85	68	47	491.1	42	41	81	14	41	0.55	0.54	0.26	p	0.51	0.34
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD209	104	71	64	25	201.2	24	40	70	16	25	0.35	0.68	0.38	o	0.57	0.64
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD23	150	83	76	54	535.5	36	46	79	17	37	0.65	0.55	0.31	p	0.58	0.46
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD239	107	46	41	33	143.2	30	24	38	12	27	0.72	0.43	0.22	p	0.63	0.44
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD24	133	73	68	43	431.7	45	47	64	21	41	0.59	0.55	0.35	o	0.73	0.51
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD248	127	59	45	39	227.1	24	23	57	11	36	0.66	0.46	0.18	p	0.40	0.31
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD249	121	67	55	41	252.3	30	31	60	13	31	0.61	0.55	0.26	p	0.52	0.42
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD268	171	100	64	51	666.9	32	43	95	16	38	0.51	0.58	0.25	p	0.45	0.42
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD270	202	91	66	43	671.5	49	38	85	15	44	0.47	0.45	0.19	p	0.45	0.34
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD273	122	75	58	55	403.7	40	34	73	18	46	0.73	0.61	0.28	p	0.47	0.39
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD278	117	58	50	38	234.9	28	25	53	16	36	0.66	0.50	0.21	p	0.47	0.44

Ruscombe	Ruscombe	ROM	Ll. Treacher	AD279	132	71	45	37	256.5	23	27	59	15	30	0.52	0.54	0.20	p	0.46	0.50
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD28	159	67	64	53	471	26	46	64	12	47	0.79	0.42	0.29	p	0.72	0.26
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD281	126	68	54	35	270	20	31	66	14	28	0.51	0.54	0.25	p	0.47	0.50
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD284	136	75	58	39	327.7	28	39	75	14	37	0.52	0.55	0.29	p	0.52	0.38
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD289	106	55	42	31	135.5	14	24	54	10	32	0.56	0.52	0.23	p	0.44	0.31
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD300	226	107	98	46	905.3	65	69	99	20	36	0.43	0.47	0.31	p	0.70	0.56
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD301	169	94	77	47	609.7	48	50	85	16	43	0.50	0.56	0.30	p	0.59	0.37
Ruscombe	Field North of Northbury Farm	ROM	Ll. Treacher	AD312	122	63	44	40	220.4	24	28	62	12	37	0.63	0.52	0.23	p	0.45	0.32
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD313	118	72	48	29	219.5	25	27	72	18	28	0.40	0.61	0.23	p	0.38	0.64
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD316	111	69	54	32	209.3	27	29	65	13	34	0.46	0.62	0.26	p	0.45	0.38
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD318	103	67	58	34	230.4	30	34	60	17	30	0.51	0.65	0.33	p	0.57	0.57
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD325	109	58	54	33	217.5	24	30	56	15	30	0.57	0.53	0.28	p	0.54	0.50
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD333	91	55	53	28	143.4	36	38	53	9	27	0.51	0.60	0.42	o	0.72	0.33
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD334	84	64	48	38	174.3	16	27	64	14	36	0.59	0.76	0.32	p	0.42	0.39
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD35	101	70	68	35	238.8	34	53	46	17	26	0.50	0.69	0.52	o	1.15	0.65
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD36	133	73	67	36	300.4	29	31	65	10	33	0.49	0.55	0.23	p	0.48	0.30
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD37	142	79	56	39	335.8	22	29	76	10	38	0.49	0.56	0.20	p	0.38	0.26
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD39	131	77	64	40	354	31	30	72	16	39	0.52	0.59	0.23	p	0.42	0.41
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD427	141	99	83	48	616.6	36	57	95	31	35	0.48	0.70	0.40	o	0.60	0.89
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD450	130	75	72	37	308	43	42	67	13	27	0.49	0.58	0.32	p	0.63	0.48
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD462	116	64	43	35	211.5	12	25	62	13	33	0.55	0.55	0.22	p	0.40	0.39
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD469	101	68	65	29	189	39	33	61	12	27	0.43	0.67	0.33	p	0.54	0.44

Ruscombe	Ruscombe	ROM	Ll. Treacher	AD472	121	81	79	36	358.7	66	43	77	20	28	0.44	0.67	0.36	p	0.56	0.71
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD477	123	83	80	47	448.1	39	61	76	16	40	0.57	0.67	0.50	o	0.80	0.40
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD482	127	70	63	57	455.6	49	43	61	23	51	0.81	0.55	0.34	p	0.70	0.45
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD492	126	77	55	39	321.6	26	31	73	14	38	0.51	0.61	0.25	p	0.42	0.37
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD494	113	62	61	31	208.3	52	46	57	15	22	0.50	0.55	0.41	o	0.81	0.68
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD504	136	82	64	40	352.3	30	45	81	17	33	0.49	0.60	0.33	p	0.56	0.52
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD505	89	70	64	26	193.4	23	52	67	19	19	0.37	0.79	0.58	c	0.78	1.00
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD508	101	68	60	35	227.3	24	39	66	15	36	0.51	0.67	0.39	o	0.59	0.42
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD511	80	57	55	32	155.3	35	39	46	15	28	0.56	0.71	0.49	o	0.85	0.54
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD520	90	65	54	39	169.2	22	33	63	13	29	0.60	0.72	0.37	o	0.52	0.45
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD524	78	50	39	25	89.1	12	26	48	9	23	0.50	0.64	0.33	p	0.54	0.39
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD558	136	72	63	40	391.4	53	49	65	19	36	0.56	0.53	0.36	o	0.75	0.53
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD563	119	70	65	40	335.8	73	54	49	15	36	0.57	0.59	0.45	o	1.10	0.42
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD572	115	52	46	41	197.4	38	28	43	15	38	0.79	0.45	0.24	p	0.65	0.39
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD607	115	65	53	33	192.9	34	27	51	9	26	0.51	0.57	0.23	p	0.53	0.35
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD637	169	91	73	49	661.8	47	41	88	17	49	0.54	0.54	0.24	p	0.47	0.35
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD674	158	85	74	51	506.9	41	42	73	14	46	0.60	0.54	0.27	p	0.58	0.30
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD738	100	60	46	27	121.4	28	29	55	9	18	0.45	0.60	0.29	p	0.53	0.50
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD742	113	56	51	29	166.4	14	37	53	15	22	0.52	0.50	0.33	p	0.70	0.68
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD75	113	79	72	52	390.3	41	50	70	20	39	0.66	0.70	0.44	o	0.71	0.51
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD751	89	56	48	27	111.8	28	31	49	9	26	0.48	0.63	0.35	p	0.63	0.35
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD752	104	58	45	28	144.1	17	26	56	11	26	0.48	0.56	0.25	p	0.46	0.42
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD756	118	71	53	33	248	25	31	71	15	28	0.46	0.60	0.26	p	0.44	0.54

Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD758	110	63	61	35	232.6	48	45	60	15	27	0.56	0.57	0.41	o	0.75	0.56
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD759	113	59	56	34	207.2	41	30	48	16	31	0.58	0.52	0.27	p	0.63	0.52
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD763	120	73	66	36	299.5	44	45	68	17	30	0.49	0.61	0.38	o	0.66	0.57
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD764	123	71	57	30	236.6	30	30	70	15	31	0.42	0.58	0.24	p	0.43	0.48
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD765	112	72	60	37	269.6	25	35	60	19	33	0.51	0.64	0.31	p	0.58	0.58
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD766	131	74	71	41	330.8	58	37	64	13	35	0.55	0.56	0.28	p	0.58	0.37
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD769	119	73	61	46	350.8	44	37	68	16	43	0.63	0.61	0.31	p	0.54	0.37
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD77	111	74	69	40	318.5	33	48	67	17	37	0.54	0.67	0.43	o	0.72	0.46
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD770	127	67	61	38	289.6	32	37	64	15	32	0.57	0.53	0.29	p	0.58	0.47
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD771	140	75	54	38	309.4	31	33	72	17	33	0.51	0.54	0.24	p	0.46	0.52
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD774	155	78	60	39	420.6	30	32	75	17	33	0.50	0.50	0.21	p	0.43	0.52
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD777	148	85	67	50	460.2	24	45	84	14	46	0.59	0.57	0.30	p	0.54	0.30
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD813	187	105	95	50	951.7	47	71	98	19	37	0.48	0.56	0.38	o	0.72	0.51
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD817	166	98	83	58	814.6	39	53	90	25	41	0.59	0.59	0.32	p	0.59	0.61
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD820	144	93	81	44	549.8	41	45	91	20	38	0.47	0.65	0.31	p	0.49	0.53
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD821	167	90	77	46	641.9	47	48	86	18	47	0.51	0.54	0.29	p	0.56	0.38
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD825	150	79	59	44	429.1	21	35	79	19	42	0.56	0.53	0.23	p	0.44	0.45
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD826	155	81	61	54	502.7	25	40	79	18	48	0.67	0.52	0.26	p	0.51	0.38
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD827	150	89	78	51	576	41	61	78	23	32	0.57	0.59	0.41	o	0.78	0.72
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD829	141	83	54	38	377.1	16	26	83	11	36	0.46	0.59	0.18	p	0.31	0.31
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD83	128	76	70	38	334	56	40	60	18	38	0.50	0.59	0.31	p	0.67	0.47
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD831	134	68	52	46	333.7	39	34	66	15	41	0.68	0.51	0.25	p	0.52	0.37
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD833	135	84	74	50	428.1	39	35	69	16	42	0.60	0.62	0.26	p	0.51	0.38

Ruscombe	Ruscombe	ROM	Ll. Treacher	AD835	98	54	52	36	160.4	38	31	46	14	28	0.67	0.55	0.32	p	0.67	0.50
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD836	109	66	54	41	232.6	27	35	48	14	39	0.62	0.61	0.32	p	0.73	0.36
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD839	200	102	67	61	793.8	49	44	98	24	61	0.60	0.51	0.22	p	0.45	0.39
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD842	135	70	54	48	345.6	43	36	66	13	38	0.69	0.52	0.27	p	0.55	0.34
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD843	141	75	68	39	474.2	42	37	71	16	41	0.52	0.53	0.26	p	0.52	0.39
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD849	124	68	61	35	286	33	43	65	15	29	0.51	0.55	0.35	p	0.66	0.52
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD850	127	73	72	41	364.9	58	57	56	19	28	0.56	0.57	0.45	o	1.02	0.68
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD851	114	77	67	37	281.6	33	43	68	16	32	0.48	0.68	0.38	o	0.63	0.50
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD852	87	59	45	37	166.3	18	32	59	13	32	0.63	0.68	0.37	o	0.54	0.41
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD855	130	99	95	41	566.4	40	85	75	23	31	0.41	0.76	0.65	c	1.13	0.74
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD858	133	81	78	39	498.1	31	54	79	24	32	0.48	0.61	0.41	o	0.68	0.75
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD860	134	85	74	56	707.4	21	70	84	28	53	0.66	0.63	0.52	o	0.83	0.53
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD861	147	85	62	42	454.9	41	42	57	17	40	0.49	0.58	0.29	p	0.74	0.43
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD866	112	77	66	49	423.5	21	50	76	27	48	0.64	0.69	0.45	o	0.66	0.56
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD873	110	73	72	44	326	54	56	59	15	37	0.60	0.66	0.51	o	0.95	0.41
Ruscombe	Northbury Farm	ROM	Ll. Treacher	AD874	112	62	54	37	246	72	52	53	21	33	0.60	0.55	0.46	o	0.98	0.64
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD876	104	70	69	34	240.7	47	51	52	16	27	0.49	0.67	0.49	o	0.98	0.59
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD877	113	69	68	45	273.5	46	45	42	20	42	0.65	0.61	0.40	o	1.07	0.48
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD879	89	69	57	33	196.6	22	40	68	16	29	0.48	0.78	0.45	o	0.59	0.55
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD880	99	60	57	32	187.6	35	36	57	12	31	0.53	0.61	0.36	o	0.63	0.39
Ruscombe	Field East of Northbury Farm	ROM	Ll. Treacher	AD887	98	69	62	41	244.4	21	45	65	17	40	0.59	0.70	0.46	o	0.69	0.43
Ruscombe	Ruscombe	ROM	Ll. Treacher	AD90	112	60	52	42	206.6	24	33	59	14	28	0.70	0.54	0.29	p	0.56	0.50

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Ruscombe	AD102	FG	very fresh	25	f	1	10	m	2	2.56		x		x					
Ruscombe	AD11	GK	slightly rolled	53	f	0	0	n	2	5.1								x	
Ruscombe	AD12	F	slightly rolled	64	f	0	5	m	2	3.24									x
Ruscombe	AD13	FM	rolled	54	p	0	20	a	0	3.66			x						
Ruscombe	AD14	DF	rolled	38	p	0	45	a	0	4.44			x						
Ruscombe	AD16	FM	rolled	49	f	0	5	m	2	5.2			x						
Ruscombe	AD17	DF	slightly rolled	43	p	0	15	a	0	9.11									
Ruscombe	AD178	F	very rolled	38	p	0	15	a	0	5.15									x
Ruscombe	AD18	M	rolled	33	u	0	20	b	0	4.12		x	x						
Ruscombe	AD20	F	very fresh	41	f	0	5	m	2	4.3								x	
Ruscombe	AD209	G	very rolled	37	f	0	0	n	2	7.99				x					
Ruscombe	AD23	DF	rolled	39	f	0	10	a	2	12.5		x						x	
Ruscombe	AD239	EF	rolled	25	u	0	20	b	0	6.74									
Ruscombe	AD24	G	rolled	31	p	0	20	a	0	4.98								x	
Ruscombe	AD248	F	slightly rolled	27	p	0	10	b	0	2.62									
Ruscombe	AD249	F	slightly rolled	32	f	0	0	n	2	4.77								x	
Ruscombe	AD268	M	slightly rolled	42	u	0	15	a	0	4.01			x						x
Ruscombe	AD270	F	slightly rolled	48	p	0	10	a	0	2.28									
Ruscombe	AD273	DF	rolled	29	u	0	45	b	0	5.14				x					
Ruscombe	AD278	F	rolled	32	f	0	20	m	2	6.17		x							
Ruscombe	AD279	F	slightly rolled	38	f	0	0	n	2	4.16									
Ruscombe	AD28	F	very fresh	46	f	0	15	a	0	5		x				x			

Ruscombe	AD281	F	rolled	26	f	0	5	m	2	3.89									x
Ruscombe	AD284	F	rolled	31	f	0	0	n	2	5.52									x
Ruscombe	AD289	FM	slightly rolled	32	f	0	0	n	2	4.36			x						x
Ruscombe	AD300	GK	slightly rolled	75	f	0	10	m	0	1.56									
Ruscombe	AD301	FG	slightly rolled	60	p	0	15	a	0	2.39									
Ruscombe	AD312	F	slightly rolled	44	p	0	10	b	2	2.68									
Ruscombe	AD313	DF	rolled	33	p	0	10	a	0	3.59				x					
Ruscombe	AD316	FG	slightly rolled	36	p	0	5	a	0	5.59				x					
Ruscombe	AD318	D	very rolled	35	p	0	10	b	2	4.6				x					x
Ruscombe	AD325	DF	very rolled	36	p	0	5	b	2	4.81				x					
Ruscombe	AD333	JK	rolled	30	p	0	20	a	1	5.08		x							
Ruscombe	AD334	F	slightly rolled	18	p	0	30	a	0	1.8									
Ruscombe	AD35	K	rolled	30	f	0	15	a	0	8.16								x	
Ruscombe	AD36	FG	very fresh	41	p	1	10	a	0	3.01				x			x		
Ruscombe	AD37	FM	slightly rolled	39	p	0	5	b	2	2.98				x					
Ruscombe	AD39	FM	slightly rolled	40	f	0	0	n	2	4.59				x					
Ruscombe	AD427	F	slightly rolled	49	f	0	0	n	2	3.13				x					x
Ruscombe	AD450	FG	slightly rolled	40	p	0	20	b	0	5.42								x	
Ruscombe	AD462	F	slightly rolled	44	f	0	0	n	2	3.93									
Ruscombe	AD469	DF	rolled	39	f	0	0	n	2	6.12				x					
Ruscombe	AD472	G	slightly rolled	29	p	0	5	b	2	3.39									
Ruscombe	AD477	H	slightly rolled	24	p	1	40	a	0	5.53						x			
Ruscombe	AD482	F	very rolled	27	p	0	30	b	0	3.13									
Ruscombe	AD492	F	very fresh	45	f	0	0	n	2	4.05				x					

Ruscombe	AD494	K	slightly rolled	32	f	0	20	m	2	4.73					
Ruscombe	AD504	D	rolled	36	p	0	20	a	2	6.16					
Ruscombe	AD505	K	rolled	26	f	0	0	n	1	5.71					
Ruscombe	AD508	DF	rolled	35	f	0	10	m	0	3.41					
Ruscombe	AD511	E	slightly rolled	20	p	0	20	b	2	4.12					x
Ruscombe	AD520	J	slightly rolled	19	f	0	10	m	2	8.75					x
Ruscombe	AD524	E	slightly rolled	25	f	0	5	m	1	3.42	x				
Ruscombe	AD558	D	rolled	45	f	0	10	m	0	5.65					
Ruscombe	AD563	HK	rolled	36	f	0	20	a	0	6.83			x		
Ruscombe	AD572	F	slightly rolled	36	p	0	20	b	0	2.36				x	
Ruscombe	AD607	DF	slightly rolled	33	p	0	15	b	2	1.74		x			
Ruscombe	AD637	F	slightly rolled	53	p	0	10	a	0	3.94					
Ruscombe	AD674	F	rolled	46	f	0	0	n	2	3.07					
Ruscombe	AD738	F	slightly rolled	33	f	0	5	m	2	4.47		x			x
Ruscombe	AD742	D	rolled	37	f	0	5	m	0	8.83					
Ruscombe	AD75	D	rolled	35	f	0	5	m	0	6.54					
Ruscombe	AD751	J	rolled	33	p	0	5	b	2	9.57					x
Ruscombe	AD752	FM	slightly rolled	40	f	0	5	m	2	3.57					x
Ruscombe	AD756	FM	rolled	43	p	0	10	a	0	3.57					x
Ruscombe	AD758	D	very rolled	45	f	0	20	m	0	3.9					x
Ruscombe	AD759	FG	rolled	21	p	0	35	a	0	3.54		x			
Ruscombe	AD763	G	slightly rolled	37	f	0	5	m	2	3.64		x			
Ruscombe	AD764	FM	rolled	40	p	0	5	b	0	3.97		x			
Ruscombe	AD765	DF	rolled	28	p	0	15	b	0	4.24					x
Ruscombe	AD766	FG	slightly rolled	46	f	0	5	m	0	4.08					
Ruscombe	AD769	F	very rolled	25	p	0	15	a	0	3.01					

Ruscombe	AD77	F	rolled	31	f	0	5	m	2	7.57							x
Ruscombe	AD770	FG	very fresh	45	f	1	5	m	2	3.59		x					
Ruscombe	AD771	FM	rolled	31	p	0	10	a	0	4.43		x					x
Ruscombe	AD774	FM	very fresh	48	f	0	10	m	0	2.8	x						
Ruscombe	AD777	DF	very fresh	36	p	0	5	b	2	4.77							
Ruscombe	AD813	GK	slightly rolled	48	p	0	25	a	0	4.85						x	
Ruscombe	AD817	G	slightly rolled	49	p	0	25	a	0	2.45			x				
Ruscombe	AD820	G	very rolled	43	u	0	10	a	0	4.71							
Ruscombe	AD821	FG	rolled	59	f	0	15	m	0	2.82		x					
Ruscombe	AD825	FM	slightly rolled	36	p	0	10	a	0	2.56	x						x
Ruscombe	AD826	F	rolled	39	p	0	20	a	0	4.42							x
Ruscombe	AD827	G	rolled	47	p	0	10	b	0	2.14							
Ruscombe	AD829	FM	rolled	33	p	0	20	b	2	4.01	x						
Ruscombe	AD83	G	rolled	33	f	0	10	m	0	2.98		x				x	
Ruscombe	AD831	F	rolled	48	f	0	5	m	2	3.08							
Ruscombe	AD833	FG	slightly rolled	49	f	0	10	m	2	3.96							
Ruscombe	AD835	E	slightly rolled	34	f	1	10	m	2	3.49		x					
Ruscombe	AD836	D	rolled	30	p	0	40	a	0	3.68							x
Ruscombe	AD839	FM	slightly rolled	51	p	0	15	a	0	8.04	x						x
Ruscombe	AD842	FM	slightly rolled	33	f	0	10	m	0	3.84		x					
Ruscombe	AD843	DF	rolled	32	p	0	25	a	2	4.82							
Ruscombe	AD849	D	very rolled	43	f	0	5	m	2	5.38							
Ruscombe	AD850	DK	very rolled	28	p	0	35	b	0	4.93						x	
Ruscombe	AD851	GJ	slightly rolled	37	f	0	5	m	2	4.58		x					
Ruscombe	AD852	E	rolled	15	p	0	45	a	0	5.54							

Ruscombe	AD855	D	very rolled	31	p	0	15	b	2	4.23								
Ruscombe	AD858	D	rolled	39	f	0	10	m	0	4.22								
Ruscombe	AD860	D	rolled	33	p	0	5	b	2	3.2								
Ruscombe	AD861	DF	rolled	22	p	0	35	b	0	5.15				x				
Ruscombe	AD866	D	very rolled	32	p	0	20	b	0	3.23								
Ruscombe	AD873	DK	rolled	26	p	0	40	b	0	5.12								x
Ruscombe	AD874	D	very rolled	15	f	0	10	m	2	4.3								
Ruscombe	AD876	K	very rolled	34	f	0	10	m	2	5.22								
Ruscombe	AD877	D	very fresh	22	p	1	45	a	0	18.43								x
Ruscombe	AD879	J	very rolled	29	f	1	5	m	2	4.48								
Ruscombe	AD880	E	slightly rolled	24	f	0	15	a	0	4.67								
Ruscombe	AD887	E	rolled	34	u	0	25	b	0	6.99								
Ruscombe	AD90	DF	rolled	28	f	0	40	a	0	3.91						x		

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Stoke Newington	Common	BM	W.G. Smith	1L14/11.1	80	57	54	29	128	35	33	45	10	27	0.51	0.71	0.44	o	0.73	0.37
Stoke Newington	Common	BM	W.G. Smith	1L14/11.2	73	55	49	30	111	18	29	54	16	26	0.55	0.75	0.25	p	0.54	0.62
Stoke Newington	Common	BM	W.G. Smith	1L14/11.3	80	45	41	38	97	32	15	37	9	37	0.84	0.56	0.40	o	0.41	0.24
Stoke Newington	Common	BM	W.G. Smith	1L14/20.1	73	60	55	20	100	24	34	55	10	17	0.33	0.82	0.33	p	0.62	0.59
Stoke Newington	Common	BM	W.G. Smith	1L14/20.2	81	48	47	25	94	42	32	36	12	23	0.52	0.59	0.52	o	0.89	0.52
Stoke Newington	Common	BM	W.G. Smith	1L14/20.3	53	35	34	17	39	18	29	36	11	9	0.49	0.66	0.34	p	0.81	1.22
Stoke Newington	Common	BM	W.G. Smith	1L14/20.4	86	67	66	32	136	37	38	56	15	27	0.48	0.78	0.43	o	0.68	0.56
Stoke Newington	Common	BM	W.G. Smith	1L14/20.5	85	57	57	36	158	43	40	48	17	33	0.63	0.67	0.51	o	0.83	0.52
Stoke Newington	Common	BM	W.G. Smith	1L14/20.6	58	43	42	19	50	28	21	40	9	15	0.44	0.74	0.48	o	0.53	0.60
Stoke Newington	Common	BM	W.G. Smith	1L14/20.7	92	62	61	28	194	34	36	58	20	21	0.45	0.67	0.37	o	0.62	0.95
Stoke Newington	Common	BM	W.G. Smith	1L14/21.1	70	45	45	23	62	35	27	41	10	18	0.51	0.64	0.50	o	0.66	0.56
Stoke Newington	Common	BM	W.G. Smith	1L14/21.2	102	57	46	31	176	28	32	50	14	29	0.54	0.56	0.27	p	0.64	0.48
Stoke Newington	Common	BM	W.G. Smith	1L14/21.3	103	55	50	30	163	39	28	47	13	25	0.55	0.53	0.38	o	0.60	0.52
Stoke Newington	Common	BM	W.G. Smith	1L14/21.4	89	58	53	33	151	32	36	43	15	24	0.57	0.65	0.36	o	0.84	0.63
Stoke Newington	Common	BM	W.G. Smith	1L14/21.5	69	49	48	32	104	31	30	46	15	22	0.65	0.71	0.45	o	0.65	0.68
Stoke Newington	Common	BM	W.G. Smith	1L14/21.6	87	57	55	28	106	46	38	36	11	24	0.49	0.66	0.53	o	1.06	0.46
Stoke Newington	Common	BM	W.G. Smith	1L14/21.7	102	55	44	41	156	20	28	53	9	32	0.75	0.54	0.20	p	0.53	0.28
Stoke Newington	Common	BM	W.G. Smith	1L14/21.8	100	47	43	31	141	32	26	41	11	29	0.66	0.47	0.32	p	0.63	0.38
Stoke Newington	Common	BM	W.G. Smith	1L14/22.1	105	80	75	41	356	28	49	73	23	34	0.51	0.76	0.27	p	0.67	0.68
Stoke Newington	Common	BM	W.G. Smith	1L14/22.2	69	55	53	20	80	28	41	44	10	19	0.36	0.80	0.41	o	0.93	0.53

Stoke Newington	Common	BM	W.G. Smith	1L14/22.3	93	55	53	26	126	42	33	41	12	26	0.47	0.59	0.45	o	0.80	0.46
Stoke Newington	Common	BM	W.G. Smith	1L14/22.4	88	54	43	27	92	28	24	48	8	21	0.50	0.61	0.32	p	0.50	0.38
Stoke Newington	Common	BM	W.G. Smith	1L14/22.5	83	60	55	29	147	28	41	56	14	26	0.48	0.72	0.34	p	0.73	0.54
Stoke Newington	Common	BM	W.G. Smith	1L14/22.6	70	35	35	22	55	35	27	26	14	16	0.63	0.50	0.50	o	1.04	0.88
Stoke Newington	Common	BM	W.G. Smith	1L14/24.1	107	52	43	34	183	26	37	51	18	21	0.65	0.49	0.24	p	0.73	0.86
Stoke Newington	Common	BM	W.G. Smith	1L14/24.2	95	68	54	19	130	24	32	60	13	16	0.28	0.72	0.25	p	0.53	0.81
Stoke Newington	Common	BM	W.G. Smith	1L14/24.3	88	60	58	28	180	45	46	52	20	21	0.47	0.68	0.51	o	0.88	0.95
Stoke Newington	Common	BM	W.G. Smith	1L14/24.4	76	57	55	34	173	20	39	53	20	31	0.60	0.75	0.26	p	0.74	0.65
Stoke Newington	Common	BM	W.G. Smith	1L14/24.5	79	53	50	23	100	32	26	39	13	22	0.43	0.67	0.41	o	0.67	0.59
Stoke Newington	Common	BM	W.G. Smith	1L14/24.6	68	55	40	26	94	17	22	55	11	24	0.47	0.81	0.25	p	0.40	0.46
Stoke Newington	Common	BM	W.G. Smith	1L14/24.7	91	63	47	32	165	24	24	62	17	25	0.51	0.69	0.26	p	0.39	0.68
Stoke Newington	Common	BM	W.G. Smith	1L14/24.8	80	47	44	28	103	34	23	41	10	26	0.60	0.59	0.43	o	0.56	0.38
Stoke Newington	Common	BM	W.G. Smith	1L15/1.1	115	60	59	46	300	58	53	41	15	24	0.77	0.52	0.50	o	1.29	0.63
Stoke Newington	Common	BM	W.G. Smith	1L15/1.2	125	84	77	51	478	44	47	72	23	39	0.61	0.67	0.35	o	0.65	0.59
Stoke Newington	Common	BM	W.G. Smith	1L15/1.3	126	72	71	65	500	64	37	53	22	59	0.90	0.57	0.51	o	0.70	0.37
Stoke Newington	Common	BM	W.G. Smith	1L15/10.1	121	69	63	48	356	47	52	54	20	46	0.70	0.57	0.39	o	0.96	0.43
Stoke Newington	Common	BM	W.G. Smith	1L15/10.2	119	89	84	41	430	38	55	81	14	35	0.46	0.75	0.32	p	0.68	0.40
Stoke Newington	Common	BM	W.G. Smith	1L15/10.3	101	65	61	29	196	31	38	55	15	21	0.45	0.64	0.31	p	0.69	0.71
Stoke Newington	Common	BM	W.G. Smith	1L15/10.4	107	78	66	43	382	29	43	72	22	43	0.55	0.73	0.27	p	0.60	0.51
Stoke Newington	Common	BM	W.G. Smith	1L15/10.5	85	50	42	38	151	5	33	48	13	37	0.76	0.59	0.06	p	0.69	0.35
Stoke Newington	Common	BM	W.G. Smith	1L15/10.6	105	50	42	34	163	23	26	48	12	32	0.68	0.48	0.22	p	0.54	0.38
Stoke Newington	Common	BM	W.G. Smith	1L15/11.1	96	76	69	32	229	30	51	65	17	28	0.42	0.79	0.31	p	0.78	0.61
Stoke Newington	Common	BM	W.G. Smith	1L15/11.2	86	64	54	38	179	20	38	52	16	29	0.59	0.74	0.23	p	0.73	0.55

Stoke Newington	Common	BM	W.G. Smith	1L15/11.3	91	56	53	32	177	31	43	44	14	28	0.57	0.62	0.34	p	0.98	0.50
Stoke Newington	Common	BM	W.G. Smith	1L15/11.4	71	56	50	29	130	14	35	57	13	25	0.52	0.79	0.20	p	0.61	0.52
Stoke Newington	Common	BM	W.G. Smith	1L15/11.5	82	51	47	39	144	37	40	46	20	27	0.76	0.62	0.45	o	0.87	0.74
Stoke Newington	Common	BM	W.G. Smith	1L15/11.6	85	58	51	24	125	23	32	55	12	21	0.41	0.68	0.27	p	0.58	0.57
Stoke Newington	Common	BM	W.G. Smith	1L15/11.7	79	56	43	22	102	3	27	51	11	19	0.39	0.71	0.04	p	0.53	0.58
Stoke Newington	Common	BM	W.G. Smith	1L15/11.8	87	54	50	37	158	29	31	47	15	31	0.69	0.62	0.33	p	0.66	0.48
Stoke Newington	Common	BM	W.G. Smith	1L15/11.9	80	48	42	22	82	25	28	37	12	20	0.46	0.60	0.31	p	0.76	0.60
Stoke Newington	Common	BM	W.G. Smith	1L15/12.1	123	56	49	30	205	30	30	53	14	29	0.54	0.46	0.24	p	0.57	0.48
Stoke Newington	Common	BM	W.G. Smith	1L15/12.2	86	64	61	39	238	12	52	63	19	39	0.61	0.74	0.14	p	0.83	0.49
Stoke Newington	Common	BM	W.G. Smith	1L15/12.3	69	53	50	27	111	26	26	45	15	23	0.51	0.77	0.38	o	0.58	0.65
Stoke Newington	Common	BM	W.G. Smith	1L15/12.4	86	47	38	23	79	22	15	45	7	20	0.49	0.55	0.26	p	0.33	0.35
Stoke Newington	Common	BM	W.G. Smith	1L15/12.5	92	65	65	33	211	42	49	44	21	23	0.51	0.71	0.46	o	1.11	0.91
Stoke Newington	Common	BM	W.G. Smith	1L15/12.6	115	58	44	41	161	24	26	55	12	33	0.71	0.50	0.21	p	0.47	0.36
Stoke Newington	Common	BM	W.G. Smith	1L15/13.1	103	57	56	31	174	56	48	45	10	27	0.54	0.55	0.54	o	1.07	0.37
Stoke Newington	Common	BM	W.G. Smith	1L15/13.2	89	63	61	37	179	23	52	61	5	35	0.59	0.71	0.26	p	0.85	0.14
Stoke Newington	Common	BM	W.G. Smith	1L15/13.3	104	81	80	34	236	46	75	54	14	29	0.42	0.78	0.44	o	1.39	0.48
Stoke Newington	Common	BM	W.G. Smith	1L15/14.1	105	82	73	49	353	37	47	69	11	45	0.60	0.78	0.35	o	0.68	0.24
Stoke Newington	Common	BM	W.G. Smith	1L15/14.2	123	71	67	38	294	55	42	57	17	27	0.54	0.58	0.45	o	0.74	0.63
Stoke Newington	Common	BM	W.G. Smith	1L15/14.3	131	93	77	41	211	36	50	89	26	34	0.44	0.71	0.27	p	0.56	0.76
Stoke Newington	Common	BM	W.G. Smith	1L15/14.4	132	68	53	26	497	50	26	51	16	22	0.38	0.52	0.38	o	0.51	0.73
Stoke Newington	Common	BM	W.G. Smith	1L15/14.5	135	70	61	28	262	41	51	63	14	29	0.40	0.52	0.30	p	0.81	0.48
Stoke Newington	Common	BM	W.G. Smith	1L15/16.1	70	42	36	19	50	15	20	42	6	15	0.45	0.60	0.21	p	0.48	0.40
Stoke Newington	Common	BM	W.G. Smith	1L15/16.2	127	78	76	34	337	62	62	65	11	25	0.44	0.61	0.49	o	0.95	0.44

Stoke Newington	Common	BM	W.G. Smith	1L15/16.3	98	56	53	35	158	35	35	50	13	20	0.63	0.57	0.36	o	0.70	0.65
Stoke Newington	Common	BM	W.G. Smith	1L15/16.4	87	49	38	23	78	18	19	49	7	22	0.47	0.56	0.21	p	0.39	0.32
Stoke Newington	Common	BM	W.G. Smith	1L15/16.5	79	56	51	22	89	24	30	53	6	20	0.39	0.71	0.30	p	0.57	0.30
Stoke Newington	Common	BM	W.G. Smith	1L15/16.6	150	86	50	38	320	30	32	86	10	38	0.44	0.57	0.20	p	0.37	0.26
Stoke Newington	FLOOR	BM	W.G. Smith	1L15/16.7	94	48	39	38	115	26	19	45	7	35	0.79	0.51	0.28	p	0.42	0.20
Stoke Newington	FLOOR	BM	W.G. Smith	1L15/16.8	90	46	45	31	93	34	32	34	10	30	0.67	0.51	0.38	o	0.94	0.33
Stoke Newington	Common	BM	W.G. Smith	1L15/17.1	106	68	57	35	213	24	33	63	13	27	0.51	0.64	0.23	p	0.52	0.48
Stoke Newington	Lower Clapon? Or common.	BM	W.G. Smith	1L15/17.2	108	68	52	39	222	24	29	67	13	33	0.57	0.63	0.22	p	0.43	0.39
Stoke Newington	Lower Clapon? Or common.	BM	W.G. Smith	1L15/17.3	101	67	45	41	221	18	24	66	10	40	0.61	0.66	0.18	p	0.36	0.25
Stoke Newington	Common	BM	W.G. Smith	1L15/17.4	67	45	40	11	36	11	21	45	6	9	0.24	0.67	0.16	p	0.47	0.67
Stoke Newington	Common	BM	W.G. Smith	1L15/17.5	65	36	31	16	35	23	19	30	4	14	0.44	0.55	0.35	o	0.63	0.29
Stoke Newington	Common	BM	W.G. Smith	1L15/17.6	64	42	36	22	51	14	20	41	8	17	0.52	0.66	0.22	p	0.49	0.47
Stoke Newington	Common	BM	W.G. Smith	1L15/17.7	98	76	75	28	217	33	38	65	11	21	0.37	0.78	0.34	p	0.58	0.52
Stoke Newington	FLOOR	BM	W.G. Smith	1L15/17.8	125	70	66	41	306	47	51	55	14	38	0.59	0.56	0.38	o	0.93	0.37
Stoke Newington	Common	BM	W.G. Smith	1L15/2.1	73	40	38	26	60	31	24	31	8	22	0.65	0.55	0.42	o	0.77	0.36
Stoke Newington	Common	BM	W.G. Smith	1L15/2.10	63	47	44	24	62	14	22	47	13	15	0.51	0.75	0.22	p	0.47	0.87
Stoke Newington	Common	BM	W.G. Smith	1L15/2.11	45	29	26	21	33	7	16	27	7	16	0.72	0.64	0.16	p	0.59	0.44
Stoke Newington	Common	BM	W.G. Smith	1L15/2.12	74	42	39	20	60	21	22	42	10	17	0.48	0.57	0.28	p	0.52	0.59
Stoke Newington	Common	BM	W.G. Smith	1L15/2.13	60	38	34	20	43	25	20	29	9	15	0.53	0.63	0.42	o	0.69	0.60
Stoke Newington	Common	BM	W.G. Smith	1L15/2.14	68	36	30	23	44	19	13	33	7	17	0.64	0.53	0.28	p	0.39	0.41
Stoke Newington	Common	BM	W.G. Smith	1L15/2.15	62	35	31	18	38	35	27	22	9	16	0.51	0.56	0.56	c	1.23	0.56
Stoke Newington	Common	BM	W.G. Smith	1L15/2.16	61	31	30	20	33	33	21	19	8	16	0.65	0.51	0.54	o	1.11	0.50

Stoke Newington	Common	BM	W.G. Smith	1L15/2.2	75	40	38	30	72	41	24	39	11	26	0.75	0.53	0.55	c	0.62	0.42
Stoke Newington	Common	BM	W.G. Smith	1L15/2.3	64	44	37	23	64	16	22	44	9	20	0.52	0.69	0.25	p	0.50	0.45
Stoke Newington	Common	BM	W.G. Smith	1L15/2.4	74	38	34	31	64	28	16	32	9	27	0.82	0.51	0.38	o	0.50	0.33
Stoke Newington	Common	BM	W.G. Smith	1L15/2.5	63	39	31	25	50	11	17	38	6	23	0.64	0.62	0.17	p	0.45	0.26
Stoke Newington	Common	BM	W.G. Smith	1L15/2.6	69	51	50	30	100	23	23	37	10	28	0.59	0.74	0.33	p	0.62	0.36
Stoke Newington	Common	BM	W.G. Smith	1L15/2.7	62	42	34	23	55	13	17	42	6	23	0.55	0.68	0.21	p	0.40	0.26
Stoke Newington	Common	BM	W.G. Smith	1L15/2.8	56	31	28	21	36	23	18	28	7	20	0.68	0.55	0.41	o	0.64	0.35
Stoke Newington	Common	BM	W.G. Smith	1L15/2.9	66	52	49	21	65	29	31	37	12	18	0.40	0.79	0.44	o	0.84	0.67
Stoke Newington	Common	BM	W.G. Smith	1L15/21.1	133	78	69	39	369	42	37	75	15	38	0.50	0.59	0.32	p	0.49	0.39
Stoke Newington	FLOOR	BM	W.G. Smith	1L15/21.2	135	75	65	45	375	57	39	58	18	41	0.60	0.56	0.42	o	0.67	0.44
Stoke Newington	Common	BM	W.G. Smith	1L15/21.3	128	72	66	42	344	50	39	69	12	39	0.58	0.56	0.39	o	0.57	0.31
Stoke Newington	Common	BM	W.G. Smith	1L15/3.1	75	40	37	16	49	33	17	36	8	15	0.40	0.53	0.44	o	0.47	0.53
Stoke Newington	Common	BM	W.G. Smith	1L15/3.10	75	47	45	27	85	26	24	45	13	16	0.57	0.63	0.35	o	0.53	0.81
Stoke Newington	Common	BM	W.G. Smith	1L15/3.11	76	45	45	27	80	28	30	42	9	17	0.60	0.59	0.37	o	0.71	0.53
Stoke Newington	Common	BM	W.G. Smith	1L15/3.12	63	57	51	25	99	19	36	49	13	22	0.44	0.90	0.30	p	0.73	0.59
Stoke Newington	Common	BM	W.G. Smith	1L15/3.13	69	51	48	26	92	24	38	45	12	13	0.51	0.74	0.35	o	0.84	0.92
Stoke Newington	Common	BM	W.G. Smith	1L15/3.14	77	48	43	27	92	33	36	32	13	21	0.56	0.62	0.43	o	1.13	0.62
Stoke Newington	Common	BM	W.G. Smith	1L15/3.2	64	35	29	17	36	17	19	31	8	15	0.49	0.55	0.27	p	0.61	0.53
Stoke Newington	Common	BM	W.G. Smith	1L15/3.3	63	44	29	20	44	7	16	42	8	19	0.45	0.70	0.11	p	0.38	0.42
Stoke Newington	Common	BM	W.G. Smith	1L15/3.4	67	51	44	22	87	17	35	51	11	21	0.43	0.76	0.25	p	0.69	0.52
Stoke Newington	Common	BM	W.G. Smith	1L15/3.5	68	43	34	34	80	19	19	42	11	31	0.79	0.63	0.28	p	0.45	0.35
Stoke Newington	Common	BM	W.G. Smith	1L15/3.6	70	44	31	24	60	20	16	44	8	21	0.55	0.63	0.29	p	0.36	0.38
Stoke Newington	Common	BM	W.G. Smith	1L15/3.7	73	41	40	21	70	36	28	31	13	22	0.51	0.56	0.49	o	0.90	0.59

Stoke Newington	Common	BM	W.G. Smith	1L15/3.8	70	46	34	25	64	27	19	40	10	21	0.54	0.66	0.39	o	0.48	0.48
Stoke Newington	Common	BM	W.G. Smith	1L15/3.9	69	39	28	23	48	24	16	39	10	20	0.59	0.57	0.35	o	0.41	0.50
Stoke Newington	Common	BM	W.G. Smith	1L15/4.1	120	77	61	48	347	26	40	75	17	41	0.62	0.64	0.22	p	0.53	0.41
Stoke Newington	Common	BM	W.G. Smith	1L15/4.2	105	58	48	25	156	15	29	57	12	24	0.43	0.55	0.14	p	0.51	0.50
Stoke Newington	Common	BM	W.G. Smith	1L15/4.3	81	56	44	22	93	19	26	55	11	20	0.39	0.69	0.23	p	0.47	0.55
Stoke Newington	Common	BM	W.G. Smith	1L15/4.4	73	46	45	33	102	34	37	36	10	30	0.72	0.63	0.47	o	1.03	0.33
Stoke Newington	Common	BM	W.G. Smith	1L15/4.5	81	40	35	23	76	58	38	35	12	20	0.58	0.49	0.72	c	1.09	0.60
Stoke Newington	Common	BM	W.G. Smith	1L15/4.6	83	59	58	33	177	41	56	49	14	29	0.56	0.71	0.49	o	1.14	0.48
Stoke Newington	Common	BM	W.G. Smith	1L15/4.7	99	57	43	30	163	28	23	56	9	28	0.53	0.58	0.28	p	0.41	0.32
Stoke Newington	Common	BM	W.G. Smith	1L15/4.8	101	52	47	37	175	64	48	40	14	33	0.71	0.51	0.63	c	1.20	0.42
Stoke Newington	Common	BM	W.G. Smith	1L15/5.1	102	62	47	38	200	15	31	61	15	36	0.61	0.61	0.15	p	0.51	0.42
Stoke Newington	Common	BM	W.G. Smith	1L15/5.2	87	56	52	29	129	27	29	42	12	27	0.52	0.64	0.31	p	0.69	0.44
Stoke Newington	Common	BM	W.G. Smith	1L15/5.3	82	72	61	36	212	22	31	71	15	33	0.50	0.88	0.27	p	0.44	0.45
Stoke Newington	Common	BM	W.G. Smith	1L15/5.4	78	61	55	34	163	26	34	56	17	28	0.56	0.78	0.33	p	0.61	0.61
Stoke Newington	Common	BM	W.G. Smith	1L15/5.5	95	64	52	26	149	24	31	57	13	21	0.41	0.67	0.25	p	0.54	0.62
Stoke Newington	Common	BM	W.G. Smith	1L15/5.6	100	56	54	37	200	35	40	51	15	32	0.66	0.56	0.35	o	0.78	0.47
Stoke Newington	Common	BM	W.G. Smith	1L15/6.1	106	66	51	40	229	26	31	63	15	32	0.61	0.62	0.25	p	0.49	0.47
Stoke Newington	Common	BM	W.G. Smith	1L15/6.2	103	70	61	46	276	24	29	66	15	39	0.66	0.68	0.23	p	0.44	0.38
Stoke Newington	Common	BM	W.G. Smith	1L15/6.3	120	71	67	33	244	49	43	55	11	23	0.46	0.59	0.41	o	0.78	0.48
Stoke Newington	Common	BM	W.G. Smith	1L15/6.4	91	57	52	37	203	16	32	57	15	35	0.65	0.63	0.18	p	0.56	0.43
Stoke Newington	Common	BM	W.G. Smith	1L15/6.5	76	72	66	33	163	23	24	61	16	27	0.46	0.95	0.30	p	0.39	0.59
Stoke Newington	Common	BM	W.G. Smith	1L15/6.6	79	50	49	22	99	41	39	35	16	18	0.44	0.63	0.52	o	1.11	0.89
Stoke Newington	Common	BM	W.G. Smith	1L15/6.7	76	55	51	26	102	25	28	49	11	18	0.47	0.72	0.33	p	0.57	0.61

Stoke Newington	Common	BM	W.G. Smith	1L15/7.1	90	65	62	28	151	36	33	56	11	26	0.43	0.72	0.40	o	0.59	0.42
Stoke Newington	Common	BM	W.G. Smith	1L15/7.2	82	61	59	27	132	30	46	52	13	25	0.44	0.74	0.37	o	0.88	0.52
Stoke Newington	Common	BM	W.G. Smith	1L15/7.3	79	47	44	27	113	44	41	43	12	19	0.57	0.59	0.56	c	0.95	0.63
Stoke Newington	Common	BM	W.G. Smith	1L15/7.4	84	63	56	33	178	19	41	60	14	28	0.52	0.75	0.23	p	0.68	0.50
Stoke Newington	Common	BM	W.G. Smith	1L15/7.5	75	57	52	33	137	27	37	52	15	32	0.58	0.76	0.36	o	0.71	0.47
Stoke Newington	Common	BM	W.G. Smith	1L15/7.6	101	71	65	32	239	41	41	50	17	24	0.45	0.70	0.41	o	0.82	0.71
Stoke Newington	Common	BM	W.G. Smith	1L15/8.1	70	54	50	33	108	22	36	49	11	25	0.61	0.77	0.31	p	0.73	0.44
Stoke Newington	Common	BM	W.G. Smith	1L15/8.2	92	36	35	24	103	26	22	42	12	24	0.67	0.39	0.28	p	0.52	0.50
Stoke Newington	Common	BM	W.G. Smith	1L15/8.3	85	45	35	24	100	19	30	42	10	24	0.53	0.53	0.22	p	0.71	0.42
Stoke Newington	Common	BM	W.G. Smith	1L15/8.4	101	60	55	36	189	43	39	46	13	35	0.60	0.59	0.43	o	0.85	0.37
Stoke Newington	Common	BM	W.G. Smith	1L15/8.5	78	56	55	24	124	33	50	46	15	18	0.43	0.72	0.42	o	1.09	0.83
Stoke Newington	Common	BM	W.G. Smith	1L15/8.6	91	54	42	36	145	21	26	53	15	30	0.67	0.59	0.23	p	0.49	0.50
Stoke Newington	Common	BM	W.G. Smith	1L15/8.7	79	53	48	22	97	22	26	52	12	19	0.42	0.67	0.28	p	0.50	0.63
Stoke Newington	Common	BM	W.G. Smith	1L15/8.8	85	48	45	35	116	10	24	48	12	20	0.73	0.56	0.12	p	0.50	0.60
Stoke Newington	Common	BM	W.G. Smith	1L15/8.9	81	51	36	28	85	15	21	49	7	26	0.55	0.63	0.19	p	0.43	0.27
Stoke Newington	Common	BM	W.G. Smith	1L15/9.1	91	54	42	36	127	20	20	51	10	36	0.67	0.59	0.22	p	0.39	0.28
Stoke Newington	Common	BM	W.G. Smith	1L15/9.2	85	52	41	28	97	29	27	39	13	27	0.54	0.61	0.34	p	0.69	0.48
Stoke Newington	Common	BM	W.G. Smith	1L15/9.3	84	58	33	24	85	23	21	54	10	21	0.41	0.69	0.27	p	0.39	0.48
Stoke Newington	Common	BM	W.G. Smith	1L15/9.4	76	50	46	32	121	32	29	43	12	26	0.64	0.66	0.42	o	0.67	0.46
Stoke Newington	Common	BM	W.G. Smith	1L15/9.5	73	59	52	32	132	43	57	41	16	15	0.54	0.81	0.59	c	1.39	1.07
Stoke Newington	Common	BM	W.G. Smith	1L15/9.6	84	64	60	25	144	22	42	58	16	20	0.39	0.76	0.26	p	0.72	0.80
Stoke Newington	Common	BM	W.G. Smith	1L15/9.7	87	52	48	30	121	47	33	32	13	27	0.58	0.60	0.54	o	1.03	0.48
Stoke Newington	Common	BM	W.G. Smith	1L15/9.9	91	79	59	42	287	18	35	79	17	37	0.53	0.87	0.20	p	0.44	0.46

Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/10.1	127	61	48	28	202	21	34	61	24	19	0.46	0.48	0.17	p	0.56	1.26
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/10.2	132	69	63	36	305	46	42	63	12	37	0.52	0.52	0.35	o	0.67	0.32
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/10.3	133	69	58	43	299	29	35	68	11	33	0.62	0.52	0.22	p	0.51	0.33
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/10.4	102	71	64	33	266	28	52	66	13	25	0.46	0.70	0.27	p	0.79	0.52
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/10.5	132	68	66	39	340	59	54	50	14	27	0.57	0.52	0.45	o	1.08	0.52
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/11.1	72	55	53	26	92	34	41	44	11	20	0.47	0.76	0.47	o	0.93	0.55
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/11.2	74	41	31	24	64	8	21	40	8	24	0.59	0.55	0.11	p	0.53	0.33
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/11.3	138	72	67	35	371	26	47	67	15	30	0.49	0.52	0.19	p	0.70	0.50
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/11.4	104	61	55	39	181	29	37	58	9	30	0.64	0.59	0.28	p	0.64	0.30
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/11.5	119	55	35	42	227	20	37	51	12	35	0.76	0.46	0.17	p	0.73	0.34
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/12.1	148	107	105	43	752	55	89	90	22	42	0.40	0.72	0.37	o	0.99	0.52
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/13.1	104	61	47	33	162	34	30	52	6	32	0.54	0.59	0.33	p	0.58	0.19
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/13.2	103	67	64	27	212	36	48	54	15	23	0.40	0.65	0.35	o	0.89	0.65
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/13.3	48	43	33	15	25	3	20	41	7	14	0.35	0.90	0.06	p	0.49	0.50
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/13.4	106	67	54	34	184	34	30	64	14	26	0.51	0.63	0.32	p	0.47	0.54
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/13.5	84	56	55	32	142	29	43	48	11	32	0.57	0.67	0.35	o	0.90	0.34
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/13.6	131	67	53	36	233	40	32	56	11	23	0.54	0.51	0.31	p	0.57	0.48
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/13.7	129	74	63	21	185	40	41	72	10	13	0.28	0.57	0.31	p	0.57	0.77
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/14.1	136	61	37	41	238	41	31	51	15	31	0.67	0.45	0.30	p	0.61	0.48
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/14.2	132	73	63	42	345	49	51	69	11	30	0.58	0.55	0.37	o	0.74	0.37
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/14.3	87	62	51	26	127	18	29	61	8	24	0.42	0.71	0.21	p	0.48	0.33
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/14.4	113	61	60	35	219	48	46	52	13	28	0.57	0.54	0.42	o	0.88	0.46
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/14.5	75	52	40	29	88	12	24	51	9	28	0.56	0.69	0.16	p	0.47	0.32

Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/14.6	70	45	29	37	81	15	8	44	11	33	0.82	0.64	0.21	p	0.18	0.33
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/15.1	121	82	80	50	426	54	50	59	12	44	0.61	0.68	0.45	o	0.85	0.27
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/15.2	116	74	67	39	270	51	39	61	13	18	0.53	0.64	0.44	o	0.64	0.72
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/15.3	107	72	50	47	257	23	35	63	17	37	0.65	0.67	0.21	p	0.56	0.46
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/15.4	136	65	64	58	501	64	34	59	30	54	0.89	0.48	0.47	o	0.58	0.56
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/16.1	67	63	62	31	131	30	39	58	13	29	0.49	0.94	0.45	o	0.67	0.45
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/16.2	69	45	39	22	65	21	29	37	12	19	0.49	0.65	0.30	p	0.78	0.63
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/16.3	71	45	32	26	60	17	17	42	8	26	0.58	0.63	0.24	p	0.40	0.31
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/16.4	101	56	48	34	159	36	28	45	9	25	0.61	0.55	0.36	o	0.62	0.36
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/16.5	93	59	49	30	132	34	29	56	9	26	0.51	0.63	0.37	o	0.52	0.35
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/16.6	92	41	36	36	100	33	16	33	17	33	0.88	0.45	0.36	o	0.48	0.52
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/16.7	75	45	44	25	94	31	27	40	10	24	0.56	0.60	0.41	o	0.68	0.42
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/16.8	86	50	44	34	129	28	31	41	13	31	0.68	0.58	0.33	p	0.76	0.42
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/16.9	76	45	40	31	90	26	22	43	10	29	0.69	0.59	0.34	p	0.51	0.34
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/17.1	157	86	79	49	554	59	53	80	17	33	0.57	0.55	0.38	o	0.66	0.52
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/17.2	198	96	90	49	731	55	57	85	16	36	0.51	0.48	0.28	p	0.67	0.44
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/18.1	135	48	41	45	293	88	42	38	18	32	0.94	0.36	0.65	c	1.11	0.56
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/18.2	95	39	32	25	73	34	19	36	8	19	0.64	0.41	0.36	o	0.53	0.42
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/18.3	86	53	46	26	90	24	29	48	9	29	0.49	0.62	0.28	p	0.60	0.31
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/18.4	70	53	53	27	118	35	32	42	17	26	0.51	0.76	0.50	o	0.76	0.65
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/18.5	98	74	66	42	216	36	37	55	12	34	0.57	0.76	0.37	o	0.67	0.35
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/18.6	114	68	63	48	324	31	47	65	15	45	0.71	0.60	0.27	p	0.72	0.33
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/19.1	81	68	65	32	172	38	33	57	16	29	0.47	0.84	0.47	o	0.58	0.55

Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/19.2	90	56	51	38	154	24	29	53	9	30	0.68	0.62	0.27	p	0.55	0.30
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/19.3	80	51	49	26	94	35	36	42	13	16	0.51	0.64	0.44	o	0.86	0.81
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/19.4	100	74	71	33	287	42	51	69	21	27	0.45	0.74	0.42	o	0.74	0.78
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/19.5	83	48	33	39	112	17	19	48	19	39	0.81	0.58	0.20	p	0.40	0.49
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/19.6	106	65	52	28	172	31	36	60	11	30	0.43	0.61	0.29	p	0.60	0.37
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/19.7	84	56	35	31	119	10	21	53	14	30	0.55	0.67	0.12	p	0.40	0.47
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/19.8	115	63	59	40	230	36	33	57	14	37	0.63	0.55	0.31	p	0.58	0.38
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/19.9	92	55	44	37	161	21	28	54	8	34	0.67	0.60	0.23	p	0.52	0.24
Stoke Newington	Common	BM	W.G. Smith	1L16/2.1	132	85	77	53	464	24	36	81	23	38	0.62	0.64	0.18	p	0.44	0.61
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/20.1	94	43	40	31	129	34	33	36	13	18	0.72	0.46	0.36	o	0.92	0.72
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/20.2	71	61	61	27	126	34	55	53	15	17	0.44	0.86	0.48	o	1.04	0.88
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/20.3	81	55	45	31	135	8	25	55	15	25	0.56	0.68	0.10	p	0.45	0.60
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/20.4	100	51	48	42	164	39	20	51	13	35	0.82	0.51	0.39	o	0.39	0.37
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/20.5	99	57	52	24	130	27	29	55	15	22	0.42	0.58	0.27	p	0.53	0.68
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/20.6	86	51	40	32	100	21	19	47	11	28	0.63	0.59	0.24	p	0.40	0.39
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/21.1	71	51	50	23	78	32	25	40	7	13	0.45	0.72	0.45	o	0.63	0.54
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/21.2	67	55	48	30	107	11	37	55	11	27	0.55	0.82	0.16	p	0.67	0.41
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/21.3	64	47	40	17	53	18	25	45	7	17	0.36	0.73	0.28	p	0.56	0.41
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/21.4	82	56	43	31	131	24	27	54	12	29	0.55	0.68	0.29	p	0.50	0.41
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/21.5	78	50	44	30	114	18	27	49	10	28	0.60	0.64	0.23	p	0.55	0.36
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/21.6	107	61	50	34	221	38	38	55	15	23	0.56	0.57	0.36	o	0.69	0.65
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/21.7	92	66	60	25	161	19	44	64	13	23	0.38	0.72	0.21	p	0.69	0.57
Stoke Newington	Common	BM	W.G. Smith	1L16/8.1	111	55	50	39	161	21	29	49	9	24	0.71	0.50	0.19	p	0.59	0.38

Stoke Newington	Common	BM	W.G. Smith	1L16/8.2	148	86	75	39	527	43	58	84	15	36	0.45	0.58	0.29	p	0.69	0.42
Stoke Newington	Common	BM	W.G. Smith	1L16/8.3	88	53	52	36	150	40	31	49	11	26	0.68	0.60	0.45	o	0.63	0.42
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/9.1	84	58	54	28	121	28	39	45	10	18	0.48	0.69	0.33	p	0.87	0.56
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/9.2	88	42	35	26	67	15	22	42	6	14	0.62	0.48	0.17	p	0.52	0.43
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/9.3	87	69	54	30	157	22	29	69	11	27	0.43	0.79	0.25	p	0.42	0.41
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/9.4	121	57	45	45	228	25	26	54	11	44	0.79	0.47	0.21	p	0.48	0.25
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/9.5	86	49	40	22	90	21	26	46	11	21	0.45	0.57	0.24	p	0.57	0.52
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/9.6	109	64	47	41	323	18	32	61	15	37	0.64	0.59	0.17	p	0.52	0.41
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/9.7	109	71	65	38	255	33	46	68	10	30	0.54	0.65	0.30	p	0.68	0.33
Stoke Newington	Geldeston Road	BM	H.S. Warren	1L16/9.8	88	70	57	30	155	15	38	68	13	27	0.43	0.80	0.17	p	0.56	0.48
Stoke Newington	Sovereign Lane	BM		1L18/1.1	127	61	52	43	316	35	31	56	13	42	0.70	0.48	0.28	p	0.55	0.31
Stoke Newington	Sovereign Lane	BM		1L18/1.2	100	59	58	27	183	46	44	46	15	23	0.46	0.59	0.46	o	0.96	0.65
Stoke Newington	Sovereign Lane	BM		1L18/1.3	106	57	54	49	236	44	42	52	13	39	0.86	0.54	0.42	o	0.81	0.33
Stoke Newington	Cazenove Road	BM		1L18/2.1	81	56	45	26	104	18	29	54	13	23	0.46	0.69	0.22	p	0.54	0.57
Stoke Newington	Cazenove Road	BM		1L18/2.2	97	71	57	43	234	27	35	63	15	35	0.61	0.73	0.28	p	0.56	0.43
Stoke Newington	Cazenove Road	BM		1L18/2.3	112	96	90	31	330	30	53	82	17	24	0.32	0.86	0.27	p	0.65	0.71
Stoke Newington	Cazenove Road	BM		1L18/2.4	114	75	68	31	246	44	37	62	17	22	0.41	0.66	0.39	o	0.60	0.77
Stoke Newington	Cazenove Road	BM		1L18/2.5	99	55	50	32	140	46	29	57	10	34	0.58	0.56	0.46	o	0.51	0.29
Stoke Newington	Various	BM		1L18/3.1	61	45	42	16	45	28	35	32	9	14	0.36	0.74	0.46	o	1.09	0.64
Stoke Newington	Various	BM		1L18/3.2	80	50	46	21	91	23	33	46	10	14	0.42	0.63	0.29	p	0.72	0.71
Stoke Newington	Various	BM		1L18/3.3	110	68	62	44	300	25	45	67	28	26	0.65	0.62	0.23	p	0.67	1.08
Stoke Newington	Various	BM		1L18/3.4	118	83	76	34	382	34	50	68	26	28	0.41	0.70	0.29	p	0.74	0.93
Stoke Newington	Various	BM		1L18/3.5	89	80	77	35	288	34	68	75	22	30	0.44	0.90	0.38	o	0.91	0.73

Stoke Newington	Various	BM	1L18/4.1	94	76	65	26	169	24	43	72	15	22	0.34	0.81	0.26	p	0.60	0.68
Stoke Newington	Various	BM	1L18/4.2	93	58	48	30	144	24	31	52	14	26	0.52	0.62	0.26	p	0.60	0.54
Stoke Newington	Various	BM	1L18/4.3	79	46	29	26	65	11	12	46	8	23	0.57	0.58	0.14	p	0.26	0.35
Stoke Newington	Various	BM	1L18/4.4	124	67	54	46	317	25	41	66	21	43	0.69	0.54	0.20	p	0.62	0.49
Stoke Newington	Various	BM	1L18/4.5	106	65	54	37	185	33	36	56	12	22	0.57	0.61	0.31	p	0.64	0.55
Stoke Newington	Various	BM	1L18/4.6	116	65	63	31	229	47	41	57	10	23	0.48	0.56	0.41	o	0.72	0.43
Stoke Newington	Various	BM	1L18/4.7	68	47	40	22	71	17	20	46	11	17	0.47	0.69	0.25	p	0.43	0.65
Stoke Newington	Hampton Park Terrace	BM	1L18/6.1	132	75	72	43	369	59	42	48	20	29	0.57	0.57	0.45	o	0.88	0.69
Stoke Newington	Hampton Park Terrace	BM	1L18/6.2	72	52	45	24	94	15	27	51	13	23	0.46	0.72	0.21	p	0.53	0.57
Stoke Newington	Various	BM	1L18/7.1	88	59	57	36	214	38	35	50	20	32	0.61	0.67	0.43	o	0.70	0.63
Stoke Newington	Various	BM	1L18/7.2	74	53	39	34	124	14	26	52	13	32	0.64	0.72	0.19	p	0.50	0.41
Stoke Newington	Various	BM	1L18/7.3	92	67	49	32	182	16	30	67	18	29	0.48	0.73	0.17	p	0.45	0.62
Stoke Newington	Graham Road	BM	1L18/8.1	71	61	59	26	109	23	39	57	11	17	0.43	0.86	0.32	p	0.68	0.65
Stoke Newington	Graham Road	BM	1L18/8.2	83	56	54	19	97	23	30	53	13	16	0.34	0.67	0.28	p	0.57	0.81
Stoke Newington	Graham Road	BM	1L18/8.3	151	77	71	43	528	45	44	72	19	40	0.56	0.51	0.30	p	0.61	0.48
Stoke Newington	Graham Road	BM	1L18/8.4	102	60	54	35	193	25	37	51	10	33	0.58	0.59	0.25	p	0.73	0.30
Stoke Newington	Graham Road	BM	1L18/8.5	103	59	51	40	201	27	30	55	12	23	0.68	0.57	0.26	p	0.55	0.52
Stoke Newington	Various	BM	1L18/9.1	90	51	47	28	113	26	41	46	13	24	0.55	0.57	0.29	p	0.89	0.54
Stoke Newington	Various	BM	1L18/9.2	94	79	74	40	295	30	59	65	26	35	0.51	0.84	0.32	p	0.91	0.74
Stoke Newington	Various	BM	1L18/9.3	98	92	92	40	456	51	79	80	25	34	0.43	0.94	0.52	o	0.99	0.74
Stoke Newington	Various	BM	1L18/9.4	134	80	54	39	321	22	33	79	14	38	0.49	0.60	0.16	p	0.42	0.37
Stoke Newington	Various	BM	1L18/9.5	80	80	67	32	209	14	46	76	19	29	0.40	1.00	0.18	p	0.61	0.66

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Stoke Newington	1L14/11.1	G	very fresh	31	f	0	15	m	2	8.63									
Stoke Newington	1L14/11.2	E	slightly rolled	27	f	0	20	m	2	3.94									
Stoke Newington	1L14/11.3	DF	slightly rolled	17	u	0	40	b	0	5.39			x				x		
Stoke Newington	1L14/20.1	J	very fresh	24	f	0	35	m	1	2.91								x	
Stoke Newington	1L14/20.2	D	rolled	16	f	0	5	m	2	6.9						x			
Stoke Newington	1L14/20.3	E	slightly rolled	17	f	0	10	m	2	6.57						x			x
Stoke Newington	1L14/20.4	EF	slightly rolled	28	p	0	5	b	2	4.83								x	
Stoke Newington	1L14/20.5	G	rolled	29	f	0	25	a	2	6.5									
Stoke Newington	1L14/20.6	J	slightly rolled	13	u	0	40	a	1	2.26									
Stoke Newington	1L14/20.7	E	very rolled		f	0	0	n	2	4.07	x								
Stoke Newington	1L14/21.1	J	slightly rolled	28	p	0	5	b	1	8.47		x							
Stoke Newington	1L14/21.2	D	rolled	47	f	0	10	m	0	4.65						x			
Stoke Newington	1L14/21.3	FG	very fresh	28	p	0	30	a	1	5.44	x	x				x			
Stoke Newington	1L14/21.4	GJ	very fresh	28	p	1	35	a	0	5.27	x							x	
Stoke Newington	1L14/21.5	E	slightly rolled	23	p	0	30	a	2	6.11		x							
Stoke Newington	1L14/21.6	E	very fresh	29	f	0	10	m	2	5.14						x		x	
Stoke Newington	1L14/21.7	F	very fresh	43	f	0	20	m	0	4.39						x	x		
Stoke Newington	1L14/21.8	DF	very fresh	25	p	1	55	a	0	8.56			x			x			
Stoke Newington	1L14/22.1	F	rolled	34	f	0	5	m	2	3.54									x
Stoke Newington	1L14/22.2	K	very rolled		f	0	0	n	2	5.62									

Stoke Newington	1L14/22.3	DF	slightly rolled	26	f	0	35	m	2	5.36				x			x		
Stoke Newington	1L14/22.4	F	very fresh	39	f	0	0	n	2	9.09	x								
Stoke Newington	1L14/22.5	GH	rolled	35	p	1	10	b	0	7.5						x		x	
Stoke Newington	1L14/22.6	K	rolled	28	f	0	0	n	1	3.19		x							
Stoke Newington	1L14/24.1	E	very rolled	32	p	0	5	a	2	8.72									
Stoke Newington	1L14/24.2	F	slightly rolled	35	f	0	25	m	2	6.47	x								x
Stoke Newington	1L14/24.3	K	very rolled		f	0	20	m	2	4.87						x			
Stoke Newington	1L14/24.4	JK	very rolled		f	0	0	n	2	3.37									
Stoke Newington	1L14/24.5	E	very rolled	31	p	0	30	a	2	6.48							x	x	
Stoke Newington	1L14/24.6	EF	very rolled		f	0	0	n	2	5.77									
Stoke Newington	1L14/24.7	DF	very rolled	44	f	0	10	m	2	5.2									
Stoke Newington	1L14/24.8	E	slightly rolled	39	p	0	40	a	2	3.58		x	x						
Stoke Newington	1L15/1.1	D	very rolled	30	p	0	50	m	0	4.36								x	
Stoke Newington	1L15/1.2	FM	very rolled	47	p	0	5	b	0	11.28	x							x	x
Stoke Newington	1L15/1.3	D	very rolled	38	f	0	0	n	2	7.48									x
Stoke Newington	1L15/10.1	L	very fresh	37	p	0	10	a	2	7.1				x		x			
Stoke Newington	1L15/10.2	GH	very fresh	45	p	0	20	a	0	4.01									x
Stoke Newington	1L15/10.3	E	slightly rolled	39	f	0	0	n	2	7.62			x						
Stoke Newington	1L15/10.4	D	rolled	28	u	0	30	b	0	5.28									x
Stoke Newington	1L15/10.5	E	very fresh	38	f	0	5	m	2	5.48									
Stoke Newington	1L15/10.6	F	slightly rolled	29	p	0	5	b	2	7.17	x	x							
Stoke Newington	1L15/11.1	G	slightly rolled	44	f	0	5	m	0	5.68									x
Stoke Newington	1L15/11.2	F	rolled	32	u	0	15	b	0	4.93									x

Stoke Newington	1L15/11.3	E	slightly rolled	41	f	0	20	m	2	2.95								x	x
Stoke Newington	1L15/11.4	E	very rolled	38	f	0	5	m	2	6.69									
Stoke Newington	1L15/11.5	E	slightly rolled	40	f	0	0	n	2	7.67									
Stoke Newington	1L15/11.6	E	very fresh	21	p	0	30	a	2	2.86									
Stoke Newington	1L15/11.7	F	very rolled	34	f	0	0	n	2	9.88									x
Stoke Newington	1L15/11.8	F	rolled	38	f	0	5	m	2	3.17				x					
Stoke Newington	1L15/11.9	F	slightly rolled	32	p	0	10	a	0	7.9	x								x
Stoke Newington	1L15/12.1	F	slightly rolled	43	f	0	10	m	0	5.17	x					x			
Stoke Newington	1L15/12.2	E	very fresh	40	f	0	0	n	2	4.01									x
Stoke Newington	1L15/12.3	E	rolled	22	u	0	60	a	0	7.03									
Stoke Newington	1L15/12.4	EF	very fresh	34	p	0	25	b	1	4.47		x	x						
Stoke Newington	1L15/12.5	JK	slightly rolled	49	f	0	15	m	0	3.64									x
Stoke Newington	1L15/12.6	DF	rolled	39	f	0	0	n	2	7.38	x								
Stoke Newington	1L15/13.1	HK	very fresh	41	f	1	10	m	2	5.18									
Stoke Newington	1L15/13.2	H	very fresh	40	p	1	10	b	0	6.58									
Stoke Newington	1L15/13.3	H	very fresh	42	f	1	5	m	1	7.49									
Stoke Newington	1L15/14.1	E	very fresh	40	u	0	45	b	0	8.23		x							
Stoke Newington	1L15/14.2	DF	very fresh	34	p	0	20	a	0	5.79	x					x			
Stoke Newington	1L15/14.3	DF	rolled	58	f	0	10	m	0	4.76									
Stoke Newington	1L15/14.4	DF	slightly rolled	39	u	0	65	a	0	6.8	x		x			x			
Stoke Newington	1L15/14.5	D	slightly rolled	47	u	0	50	a	0	7.68						x			
Stoke Newington	1L15/16.1	EF	very fresh	44	f	0	0	n	2	5.7									
Stoke Newington	1L15/16.2	K	very fresh	79	p	1	5	b	2	2.55								x	

Stoke Newington	1L15/16.3	GJ	slightly rolled	62	f	0	5	m	0	3.55									
Stoke Newington	1L15/16.4	F	very fresh	38	p	0	20	b	2	6.14	x								
Stoke Newington	1L15/16.5	J	very fresh	23	f	0	0	n	1	3.32									
Stoke Newington	1L15/16.6	FM	slightly rolled	69	p	0	5	b	2	4.9	x								
Stoke Newington	1L15/16.7	EF	slightly rolled	30	p	0	5	b	1	3.37		x							
Stoke Newington	1L15/16.8	E	very fresh	46	p	0	10	b	2	9.36									
Stoke Newington	1L15/17.1	FG	rolled	58	f	0	5	m	2	4.67							x		
Stoke Newington	1L15/17.2	FG	very rolled	50	f	0	0	n	2	7.82							x		x
Stoke Newington	1L15/17.3	F	slightly rolled	46	p	0	5	b	2	2.33									
Stoke Newington	1L15/17.4	J	slightly rolled	28	f	0	0	n	1	3.01									
Stoke Newington	1L15/17.5	EF	very fresh	26	u	0	45	b	0	6.37								x	
Stoke Newington	1L15/17.6	E	very fresh	24	f	0	5	m	1	4	x								
Stoke Newington	1L15/17.7	JK	very fresh	26	p	0	30	a	1	2.52									
Stoke Newington	1L15/17.8	HK	very fresh	30	p	1	30	b	0	3.96						x			
Stoke Newington	1L15/2.1	E	very fresh	24	f	0	10	m	2	8.82									
Stoke Newington	1L15/2.10	E	rolled	30	f	0	0	n	2	4.75									
Stoke Newington	1L15/2.11	E	very fresh	17	p	0	40	a	1	9.53		x		x					
Stoke Newington	1L15/2.12	F	slightly rolled	42	f	0	0	n	2	2.58		x							
Stoke Newington	1L15/2.13	E	very fresh	28	f	0	0	n	2	5.29		x							
Stoke Newington	1L15/2.14	EF	very fresh	27	p	0	25	a	2	3.72		x							
Stoke Newington	1L15/2.15	E	very fresh	20	u	0	65	a	0	7.38						x			
Stoke Newington	1L15/2.16	E	very fresh	18	u	0	70	a	0	3.66						x			
Stoke Newington	1L15/2.2	J	very fresh	33	f	0	0	n	2	3.87					x				

Stoke Newington	1L15/2.3	J	slightly rolled	34	f	0	5	m	2	3.16								
Stoke Newington	1L15/2.4	F	very fresh	17	p	0	15	b	2	5.17	x	x						
Stoke Newington	1L15/2.5	FM	very fresh	29	p	0	35	b	2	8.25	x	x						x
Stoke Newington	1L15/2.6	E	very fresh	27	u	0	35	b	0	5.82							x	
Stoke Newington	1L15/2.7	EF	rolled	25	p	0	10	a	2	4.36				x				
Stoke Newington	1L15/2.8	E	slightly rolled	26	u	0	10	b	0	7.14	x							
Stoke Newington	1L15/2.9	K	slightly rolled	29	f	0	5	m	2	3.43			x					
Stoke Newington	1L15/21.1	F	rolled		p	0	10	b	2	3.68								
Stoke Newington	1L15/21.2	FG	very fresh	51	u	0	20	b	0	5.31								
Stoke Newington	1L15/21.3	FG	slightly rolled	48	f	0	10	m	0	4.62								
Stoke Newington	1L15/3.1	EF	very fresh	17	p	0	40	a	2	3.56			x		x			
Stoke Newington	1L15/3.10	EF	rolled	25	p	0	25	a	0	4.44	x							
Stoke Newington	1L15/3.11	K	very fresh	33	f	0	0	n	2	7.45							x	
Stoke Newington	1L15/3.12	E	rolled	37	u	0	5	b	2	5.18								x
Stoke Newington	1L15/3.13	K	rolled	28	p	0	25	a	1	4.29								
Stoke Newington	1L15/3.14	E	slightly rolled	38	f	0	0	n	2	5.1							x	x
Stoke Newington	1L15/3.2	F	slightly rolled	37	f	0	0	n	2	2.78								
Stoke Newington	1L15/3.3	F	very fresh	27	p	0	25	a	2	2.84								
Stoke Newington	1L15/3.4	K	slightly rolled	49	f	0	0	n	2	4.69	x							
Stoke Newington	1L15/3.5	F	slightly rolled	25	f	0	5	m	2	3.43		x					x	
Stoke Newington	1L15/3.6	F	very fresh	34	p	0	10	b	2	4.45								
Stoke Newington	1L15/3.7	E	slightly rolled	33	p	0	15	a	2	3.69								x
Stoke Newington	1L15/3.8	EF	very fresh	24	p	0	15	a	2	3.6								x

Stoke Newington	1L15/3.9	EF	very fresh	27	u	0	10	b	0	6.39			x						
Stoke Newington	1L15/4.1	DF	very fresh	47	p	0	10	b	2	2.94	x								
Stoke Newington	1L15/4.2	F	very fresh	40	f	0	25	m	2	6.18	x								
Stoke Newington	1L15/4.3	EF	very fresh	36	f	0	15	m	2	7	x								
Stoke Newington	1L15/4.4	E	very fresh	28	u	0	35	a	0	6.83						x		x	
Stoke Newington	1L15/4.5	D	very fresh	23	f	0	25	m	2	10.72						x			
Stoke Newington	1L15/4.6	HK	very fresh	38	f	1	15	m	2	5.36									
Stoke Newington	1L15/4.7	F	very fresh	30	u	0	50	b	0	2.68						x			
Stoke Newington	1L15/4.8	DK	very fresh	32	f	0	5	m	2	5.3						x			
Stoke Newington	1L15/5.1	F	rolled	35	p	0	10	b	2	4.37									x
Stoke Newington	1L15/5.2	J	rolled	29	u	0	40	a	0	5.35									
Stoke Newington	1L15/5.3	E	very rolled	28	p	0	10	b	2	4.05									
Stoke Newington	1L15/5.4	E	very rolled	42	f	0	0	n	2	11.44							x		
Stoke Newington	1L15/5.5	F	very rolled	33	u	0	20	b	0	4.4									
Stoke Newington	1L15/5.6	E	slightly rolled	41	p	0	30	a	0	8.99						x	x		
Stoke Newington	1L15/6.1	F	rolled	45	u	0	20	b	0	2.46									
Stoke Newington	1L15/6.2	F	very rolled	32	p	0	10	b	2	4.45	x								
Stoke Newington	1L15/6.3	GJ	slightly rolled	46	p	0	5	a	0	5.62	x								
Stoke Newington	1L15/6.4	E	very rolled	33	p	0	10	a	2	6.47							x		
Stoke Newington	1L15/6.5	E	very rolled	23	f	0	10	a	0	5.04									
Stoke Newington	1L15/6.6	E	rolled	31	f	0	0	n	2	6.83									
Stoke Newington	1L15/6.7	J	slightly rolled	37	f	0	0	n	2	4.11					x		x		
Stoke Newington	1L15/7.1	J	very rolled	46	p	0	10	a	0	4.53									

Stoke Newington	1L15/7.2	K	rolled	34	f	1	0	n	2	2.14									
Stoke Newington	1L15/7.3	E	very rolled	31	f	0	0	n	2	8.77									
Stoke Newington	1L15/7.4	E	very rolled	33	p	0	5	b	2	3.87									
Stoke Newington	1L15/7.5	E	slightly rolled	38	f	0	5	m	2	6.5									
Stoke Newington	1L15/7.6	E	very rolled	37	f	0	0	n	2	9.18								x	
Stoke Newington	1L15/8.1	E	very fresh	29	f	0	25	m	0	4.89									
Stoke Newington	1L15/8.2	DF	slightly rolled	31	u	0	40	a	0	8.79	x								
Stoke Newington	1L15/8.3	E	very fresh	35	f	0	0	n	2	7.99	x								
Stoke Newington	1L15/8.4	E	slightly rolled	48	f	0	15	a	0	4.82									
Stoke Newington	1L15/8.5	HK	slightly rolled	35	f	1	5	m	2	3.31									
Stoke Newington	1L15/8.6	EF	slightly rolled	37	f	0	10	m	2	6.13							x		
Stoke Newington	1L15/8.7	EF	slightly rolled	35	f	0	10	m	2	15.41	x						x		
Stoke Newington	1L15/8.8	EF	rolled	34	f	0	0	n	2	8.81	x								
Stoke Newington	1L15/8.9	EF	rolled	26	f	0	0	n	2	7.4	x								
Stoke Newington	1L15/9.1	EF	very fresh	26	p	0	50	a	0	9.71	x					x			
Stoke Newington	1L15/9.2	J	very fresh	33	p	0	25	a	2	7.31								x	
Stoke Newington	1L15/9.3	EF	slightly rolled	32	p	0	40	a	0	6.16	x								
Stoke Newington	1L15/9.4	GJ	very rolled		p	0	15	a	0	6.38								x	
Stoke Newington	1L15/9.5	K	slightly rolled	36	u	0	30	m	2	4.06									
Stoke Newington	1L15/9.6	JK	slightly rolled	44	f	0	0	n	2	3.95					x				
Stoke Newington	1L15/9.7	E	slightly rolled	32	p	0	30	a	2	11.61								x	x
Stoke Newington	1L15/9.9	E	very rolled		f	0	0	n	2	4.9									
Stoke Newington	1L16/10.1	L	slightly rolled	42	f	0	10	m	0	7.89	x			x		x			

Stoke Newington	1L16/10.2	GJ	slightly rolled	58	p	0	20	a	0	4.42									
Stoke Newington	1L16/10.3	F	very fresh	80	p	0	5	b	2	2.06								x	
Stoke Newington	1L16/10.4	F	very fresh	31	p	0	25	b	0	4.25									x
Stoke Newington	1L16/10.5	DK	slightly rolled	42	f	0	20	m	0	4.36								x	
Stoke Newington	1L16/11.1	H	slightly rolled	33	f	0	5	m	1	6.43									
Stoke Newington	1L16/11.2	F	very fresh	34	u	0	25	b	0	3.67	x								
Stoke Newington	1L16/11.3	D	slightly rolled	40	p	0	40	a	2	4.93		x							
Stoke Newington	1L16/11.4	FG	very fresh	29	u	0	20	b	0	3.2									
Stoke Newington	1L16/11.5	DF	slightly rolled	53	f	0	20	m	0	6.83	x					x			
Stoke Newington	1L16/12.1	H	slightly rolled	85	f	1	5	m	2	3.39								x	
Stoke Newington	1L16/13.1	FG	very fresh	39	f	0	5	m	0	7.01		x							
Stoke Newington	1L16/13.2	HK	very fresh	46	f	1	15	m	2	3		x							
Stoke Newington	1L16/13.3	F	very fresh	32	f	0	0	n	2	4.92									x
Stoke Newington	1L16/13.4	F	rolled	57	f	0	0	n	2	4.75	x								x
Stoke Newington	1L16/13.5	DK	slightly rolled	30	u	1	30	b	0	4.54						x			
Stoke Newington	1L16/13.6	FM	slightly rolled	45	p	0	20	a	0	2.12			x						x
Stoke Newington	1L16/13.7	F	very fresh	56	f	0	0	n	2	2.28									
Stoke Newington	1L16/14.1	FM	slightly rolled	52	u	0	20	b	0	5.33			x						
Stoke Newington	1L16/14.2	GH	very fresh	46	p	0	15	a	0	3.37									
Stoke Newington	1L16/14.3	EF	very fresh	37	f	0	15	m	2	4.92		x					x		
Stoke Newington	1L16/14.4	K	very fresh	56	f	0	5	m	2	2.37								x	
Stoke Newington	1L16/14.5	EF	very fresh	52	p	0	30	b	0	2.57		x							
Stoke Newington	1L16/14.6	E	very fresh	28	p	0	60	a	0	7.89									

Stoke Newington	1L16/15.1	H	very fresh	59	p	1	40	a	0	5						x			
Stoke Newington	1L16/15.2	D	very fresh	44	p	0	60	a	0	4.63			x			x			
Stoke Newington	1L16/15.3	D	slightly rolled	31	u	0	55	b	0	16.06	x								
Stoke Newington	1L16/15.4	DF	very fresh	46	p	0	5	b	2	5.3	x								x
Stoke Newington	1L16/16.1	DK	slightly rolled	51	p	0	10	a	0	3.93									
Stoke Newington	1L16/16.2	E	slightly rolled	36	f	0	0	n	2	16.43									x
Stoke Newington	1L16/16.3	EF	slightly rolled	41	p	0	5	b	2	4.44	x							x	
Stoke Newington	1L16/16.4	D	rolled	23	u	0	60	a	0	8.87									
Stoke Newington	1L16/16.5	EF	slightly rolled	32	p	0	25	a	2	7.32	x								
Stoke Newington	1L16/16.6	E	very fresh	28	p	0	15	b	2	6.95									
Stoke Newington	1L16/16.7	E	rolled	37	u	0	15	b	2	4.27		x							
Stoke Newington	1L16/16.8	E	rolled	43	p	0	35	a	0	3.43									
Stoke Newington	1L16/16.9	EF	slightly rolled	28	p	0	25	b	2	3.86		x	x						
Stoke Newington	1L16/17.1	G	rolled	96	f	0	10	m	2	5.01						x	x		
Stoke Newington	1L16/17.2	FG	rolled	75	u	0	30	b	0	2.23									
Stoke Newington	1L16/18.1	D	rolled	31	u	0	70	a	0	9.07						x			
Stoke Newington	1L16/18.2	EF	slightly rolled	41	p	0	10	b	2	4.59				x					
Stoke Newington	1L16/18.3	EF	rolled	40	u	0	45	b	2	3.21		x							
Stoke Newington	1L16/18.4	E	slightly rolled	30	u	0	45	a	0	9.69									
Stoke Newington	1L16/18.5	E	slightly rolled	43	p	0	10	b	2	7.63									
Stoke Newington	1L16/18.6	DK	rolled	65	f	0	20	m	0	7.8									
Stoke Newington	1L16/19.1	E	slightly rolled	59	f	0	0	n	2	5.24									
Stoke Newington	1L16/19.2	G	rolled	36	f	0	0	n	2	5.95							x		

Stoke Newington	1L16/19.3	K	very fresh	34	f	0	0	n	2	3.67									
Stoke Newington	1L16/19.4	D	very rolled	46	u	0	50	a	0	5.08									x
Stoke Newington	1L16/19.5	E	slightly rolled	34	p	0	10	b	2	8.71				x					
Stoke Newington	1L16/19.6	F	slightly rolled	58	f	0	0	n	2	4.26							x		
Stoke Newington	1L16/19.7	E	slightly rolled	25	u	0	55	b	0	2.85									
Stoke Newington	1L16/19.8	F	rolled	48	p	0	10	b	2	2.06									
Stoke Newington	1L16/19.9	EF	slightly rolled	52	f	0	0	n	2	3.25									x
Stoke Newington	1L16/2.1	D	slightly rolled	30	f	0	0	n	2	4.96									
Stoke Newington	1L16/20.1	L	rolled	43	f	0	0	n	2	13.69						x			
Stoke Newington	1L16/20.2	HK	very rolled	61	f	0	0	n	2	3.36									
Stoke Newington	1L16/20.3	EF	slightly rolled	37	u	0	20	b	0	12.38									
Stoke Newington	1L16/20.4	DF	very rolled	24	p	0	40	a	0	3.47			x						
Stoke Newington	1L16/20.5	G	rolled	39	u	0	10	b	0	3.05							x		
Stoke Newington	1L16/20.6	EF	rolled	66	f	0	0	n	2	5.17	x						x		x
Stoke Newington	1L16/21.1	E	very fresh	35	f	0	5	m	2	5.04									
Stoke Newington	1L16/21.2	E	rolled	31	p	0	10	b	2	3.85									
Stoke Newington	1L16/21.3	E	very fresh	38	f	0	0	n	2	9.4	x								
Stoke Newington	1L16/21.4	EF	slightly rolled	55	p	0	20	b	0	3.41	x								
Stoke Newington	1L16/21.5	E	slightly rolled	39	p	0	15	a	1	5.82		x							
Stoke Newington	1L16/21.6	D	very rolled	39	p	0	25	m	2	4.8									
Stoke Newington	1L16/21.7	JK	very rolled		f	0	0	n	2	2.29									
Stoke Newington	1L16/8.1	F	very fresh	43	p	0	40	a	0	8.74	x					x			
Stoke Newington	1L16/8.2	FG	very fresh	72	f	0	5	m	2	5.71									

Stoke Newington	1L16/8.3	G	slightly rolled	37	f	0	0	n	2	4.82								x	
Stoke Newington	1L16/9.1	GH	very fresh	36	p	1	20	b	0	3.5									
Stoke Newington	1L16/9.2	EF	very fresh	43	p	0	10	a	0	3	x		x						
Stoke Newington	1L16/9.3	EF	slightly rolled	40	u	0	20	b	0	3.81									
Stoke Newington	1L16/9.4	DF	slightly rolled	38	p	0	30	a	0	4.1		x	x				x		
Stoke Newington	1L16/9.5	F	slightly rolled	32	f	0	0	n	2	7.97								x	x
Stoke Newington	1L16/9.6	DF	slightly rolled	45	p	0	15	b	2	5.95									
Stoke Newington	1L16/9.7	G	very fresh	56	p	0	20	a	2	8.13		x							
Stoke Newington	1L16/9.8	E	slightly rolled	36	p	0	5	b	2	3.31									x
Stoke Newington	1L18/1.1	DF	rolled	50	p	0	65	a	0	3.03						x			
Stoke Newington	1L18/1.2	GK	very rolled		f	0	0	n	2	3.24									
Stoke Newington	1L18/1.3	H	slightly rolled	71	p	1	10	b	2	5.38								x	
Stoke Newington	1L18/2.1	EF	very rolled	56	f	0	0	n	2	2.27			x						
Stoke Newington	1L18/2.2	EF	very rolled	44	f	0	0	n	2	5									
Stoke Newington	1L18/2.3	J	rolled	62	f	0	0	n	2	5.22									x
Stoke Newington	1L18/2.4	G	rolled	64	f	0	0	n	2	3.39									x
Stoke Newington	1L18/2.5	DF	very rolled	39	f	0	0	n	2	17.33									x
Stoke Newington	1L18/3.1	K	very fresh	49	f	0	0	n	2	4.52									
Stoke Newington	1L18/3.2	J	rolled	52	f	0	0	n	2	2.86									
Stoke Newington	1L18/3.3	FG	very rolled	51	f	0	0	n	2	3.31									x
Stoke Newington	1L18/3.4	G	very rolled	57	f	0	0	n	2	6.29									x
Stoke Newington	1L18/3.5	HK	very rolled	47	f	0	0	n	2	7.38									x
Stoke Newington	1L18/4.1	J	rolled	47	p	0	20	b	0	5.38									

Stoke Newington	1L18/4.2	D	rolled	44	p	0	5	b	2	6.94				x					
Stoke Newington	1L18/4.3	M	rolled	39	f	0	0	n	2	4.02			x						
Stoke Newington	1L18/4.4	D	rolled	53	f	0	0	n	2	9.47									x
Stoke Newington	1L18/4.5	DF	rolled	39	p	0	15	a	0	8.63									
Stoke Newington	1L18/4.6	JK	slightly rolled	60	f	0	0	n	2	4.32									
Stoke Newington	1L18/4.7	E	rolled	28	u	0	50	b	0	5.9									
Stoke Newington	1L18/6.1	G	very rolled		f	0	0	n	2	11.6									x
Stoke Newington	1L18/6.2	J	very rolled	43	f	0	0	n	2	4.15					x				
Stoke Newington	1L18/7.1	E	rolled	23	u	0	75	b	0	5.74						x			
Stoke Newington	1L18/7.2	E	very rolled		f	0	0	n	2	4.96									
Stoke Newington	1L18/7.3	E	very rolled		p	0	15	b	0	3.84	x								
Stoke Newington	1L18/8.1	K	very rolled	25	f	0	15	m	2	3.92									
Stoke Newington	1L18/8.2	J	very rolled	49	p	0	5	b	1	4.53									
Stoke Newington	1L18/8.3	FG	very rolled	79	u	0	25	b	0	3.95									
Stoke Newington	1L18/8.4	D	very rolled	56	f	0	0	n	2	8.25									x
Stoke Newington	1L18/8.5	D	very rolled		f	0	0	n	2	4.83			x						
Stoke Newington	1L18/9.1	K	slightly rolled	48	p	0	15	a	0	6.96					x				
Stoke Newington	1L18/9.2	D	very rolled		f	0	0	n	2	5.6									x
Stoke Newington	1L18/9.3	DK	very rolled		f	0	20	m	0	3.12									
Stoke Newington	1L18/9.4	FM	rolled	71	p	0	10	b	2	3.85			x						
Stoke Newington	1L18/9.5	E	very rolled		f	0	0	n	2	11.14									x

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Thetford	Thetford	BM	J. Evans	2A6/02.1	125	72	71	43	338.2	54	50	59	16	33	0.60	0.58	0.43	O	0.85	0.48
Thetford	Thetford	BM	J. Evans	2A6/02.2	114	67	54	33	197.1	29	31	57	15	19	0.49	0.59	0.25	P	0.54	0.79
Thetford	Thetford	BM	J. Prestwich	2A6/02.3	119	78	71	34	318.4	19	45	78	15	28	0.44	0.66	0.16	P	0.58	0.54
Thetford	Thetford	BM	J. Prestwich	2A6/02.4	165	103	101	48	881.1	72	59	85	20	39	0.47	0.62	0.44	O	0.69	0.51
Thetford	Thetford	BM	J. Lubbock	2A6/03.2	135	79	75	45	458.3	55	52	56	22	36	0.57	0.59	0.41	O	0.93	0.61
Thetford	Thetford	BM	J. Lubbock	2A6/03.3	112	68	50	32	202.2	22	68	29	28	14	0.47	0.61	0.20	P	2.34	2.00
Thetford	Thetford	BM	J.W. Flower	2A6/03.4	126	79	75	39	383	80	62	70	16	34	0.49	0.63	0.63	C	0.89	0.47
Thetford	Thetford	BM	J. Evans	2A6/03.5	113	90	76	42	476.3	35	54	80	27	39	0.47	0.80	0.31	P	0.68	0.69
Thetford	Thetford	BM	J.W. Flower	2A6/04.1	165	109	78	66	928.2	44	47	98	32	46	0.61	0.66	0.27	P	0.48	0.70
Thetford	Thetford	BM	J.W. Flower	2A6/04.2	111	62	54	46	328.8	32	36	59	21	38	0.74	0.56	0.29	P	0.61	0.55
Thetford	Thetford	BM	J. Prestwich	2A6/04.3	91	76	64	34	236.2	22	42	71	22	26	0.45	0.84	0.24	P	0.59	0.85
Thetford	Thetford	BM	J. Prestwich	2A6/04.5	121	76	72	35	325	36	46	73	14	37	0.46	0.63	0.30	P	0.63	0.38
Thetford	Thetford	BM		2A6/07.1	118	67	42	36	192.5	23	20	67	10	32	0.54	0.57	0.19	P	0.30	0.31
Thetford	Thetford	BM	WGS	2A6/08.3	100	76	75	26	195.9	43	46	63	17	19	0.34	0.76	0.43	O	0.73	0.89
Thetford	Thetford	BM	WGS	2A6/08.4	76	48	38	20	66.3	21	23	45	10	17	0.42	0.63	0.28	P	0.51	0.59
Thetford	Thetford	BM		2A6/10.1	95	63	45	28	154.1	18	26	57	13	27	0.44	0.66	0.19	P	0.46	0.48
Thetford	Thetford	BM		2A6/10.2	93	63	55	31	156.7	33	34	53	10	28	0.49	0.68	0.35	O	0.64	0.36
Thetford	Thetford	BM		2A6/10.3	90	58	43	23	106.5	19	25	54	12	20	0.40	0.64	0.21	P	0.46	0.60
Thetford	Thetford	BM		2A6/10.4	112	58	50	34	183.3	37	31	53	12	29	0.59	0.52	0.33	P	0.58	0.41
Thetford	Thetford	BM		2A6/10.5	86	55	50	29	136.9	18	35	50	15	26	0.53	0.64	0.21	P	0.70	0.58

Thetford	Thetford	BM	2A6/11.1	105	67	56	38	222.6	33	39	56	16	33	0.57	0.64	0.31	P	0.70	0.48
Thetford	Thetford	PRM	Box 1.1	112	59	56	27		39	28	46	15	19	0.46	0.53	0.35	P	0.61	0.79
Thetford	Thetford	PRM	Box 1.2	108	74	52	28		19	28	73	10	25	0.38	0.69	0.18	P	0.38	0.40
Thetford	Thetford	PRM	Box 1.4	87	56	50	26		30	25	49	13	23	0.46	0.64	0.34	P	0.51	0.57
Thetford	Thetford	PRM	Box 1.5	92	54	50	34		40	37	50	12	27	0.63	0.59	0.43	O	0.74	0.44
Thetford	Thetford	PRM	Box 2.1	93	59	55	38		27	30	52	13	34	0.64	0.63	0.29	P	0.58	0.38
Thetford	Thetford	PRM	Box 2.2	111	68	54	31		30	34	65	14	26	0.46	0.61	0.27	P	0.52	0.54
Thetford	Thetford	PRM	Box 3.1	114	66	62	30		32	43	62	16	29	0.45	0.58	0.28	P	0.69	0.55
Thetford	Thetford	PRM	Box 3.2	128	76	74	42		57	45	58	20	31	0.55	0.59	0.45	O	0.78	0.65
Thetford	Thetford	PRM	Box 3.5	128	92	82	44		21	53	89	20	38	0.48	0.72	0.16	P	0.60	0.53
Thetford	Thetford	PRM	Box 4.1	91	50	47	34		28	34	47	16	18	0.68	0.55	0.31	P	0.72	0.89
Thetford	Thetford	PRM	Box 4.2	105	70	66	22		34	45	61	15	19	0.31	0.67	0.32	P	0.74	0.79
Thetford	Thetford	PRM	Box 4.4	107	93	93	33		68	86	74	20	31	0.35	0.87	0.64	C	1.16	0.65
Thetford	Thetford	PRM	Box 4.6	133	90	83	35		40	55	79	17	23	0.39	0.68	0.30	P	0.70	0.74
Thetford	Thetford	PRM	Box 5.1	134	69	53	34		21	29	66	13	33	0.49	0.51	0.16	P	0.44	0.39
Thetford	Thetford	PRM	Box 5.4	112	72	69	35		48	48	57	21	29	0.49	0.64	0.43	O	0.84	0.72
Thetford	Thetford	PRM	Box 6.2	120	66	40	21		18	24	66	13	16	0.32	0.55	0.15	P	0.36	0.81
Thetford	Thetford	PRM	Box 6.4	129	88	83	33		34	56	85	22	29	0.38	0.68	0.26	P	0.66	0.76
Thetford	Thetford	PRM	Box 6.5	99	62	55	27		29	29	56	16	20	0.44	0.63	0.29	P	0.52	0.80
Thetford	Thetford	PRM	Box 7.1	100	62	48	28		24	30	62	11	23	0.45	0.62	0.24	P	0.48	0.48
Thetford	Thetford	PRM	Box 7.2	128	95	72	43		25	40	94	20	39	0.45	0.74	0.20	P	0.43	0.51
Thetford	Thetford	PRM	Box 7.3	126	61	51	44		38	36	54	23	35	0.72	0.48	0.30	P	0.67	0.66
Thetford	Thetford	PRM	Box 8.2	109	76	71	36		48	56	69	16	36	0.47	0.70	0.44	O	0.81	0.44

Thetford	Thetford	BM	WGS	2A6/08.1	135	79	72	44	399.7	35	55	66	18	43	0.56	0.59	0.26	P	0.83	0.42
Thetford	Thetford	PRM		Box 4.5	135	83	82	31		72	67	65	19	24	0.37	0.61	0.53	O	1.03	0.79
Thetford	Thetford	BM	J. Prestwich	2A6/04.4	136	88	78	57	549.7	47	50	71	18	41	0.65	0.65	0.35	P	0.70	0.44
Thetford	Thetford	BM	J. Prestwich	2A6/03.1	140	81	70	34	370.9	38	46	71	10	28	0.42	0.58	0.27	P	0.65	0.36
Thetford	Thetford	BM		2A6/08.2	143	81	78	51	596.5	40	52	76	24	48	0.63	0.57	0.28	P	0.68	0.50
Thetford	Thetford	PRM		Box 5.2	144	83	71	46		48	45	80	15	44	0.55	0.58	0.33	P	0.56	0.34
Thetford	Thetford	PRM		Box 2.4	148	84	64	45		49	35	77	22	40	0.54	0.57	0.33	P	0.45	0.55
Thetford	Thetford	PRM		Box 6.1	150	77	67	41		38	39	73	20	33	0.53	0.51	0.25	P	0.53	0.61
Thetford	Thetford	PRM		Box 4.3	151	92	59	40		31	41	91	20	36	0.43	0.61	0.21	P	0.45	0.56
Thetford	Thetford	PRM		Box 7.4	153	93	85	40		66	53	68	21	37	0.43	0.61	0.43	O	0.78	0.57
Thetford	Thetford	PRM		Box 2.5	158	77	74	48		80	49	56	23	48	0.62	0.49	0.51	O	0.88	0.48
Thetford	Thetford	PRM		Box 8.1	159	88	65	39		35	42	88	21	37	0.44	0.55	0.22	P	0.48	0.57
Thetford	Thetford	PRM		Box 2.3	161	65	63	61		79	40	52	20	48	0.94	0.40	0.49	O	0.77	0.42
Thetford	Thetford	PRM		Box 3.4	167	84	67	39		28	40	80	17	31	0.46	0.50	0.17	P	0.50	0.55
Thetford	Thetford	PRM		Box 1.6	168	81	52	40		40	33	76	17	35	0.49	0.48	0.24	P	0.43	0.49
Thetford	Thetford	PRM		Box 6.3	173	91	71	52		39	49	86	25	52	0.57	0.53	0.23	P	0.57	0.48
Thetford	Thetford	PRM		Box 1.3	175	89	70	50		35	32	89	15	43	0.56	0.51	0.20	P	0.36	0.35
Thetford	Thetford	PRM		Box 1.7	196	108	104	53		86	68	78	25	39	0.49	0.55	0.44	O	0.87	0.64
Thetford	Thetford	PRM		Box 3.3	200	95	73	55		39	43	93	19	41	0.58	0.48	0.20	P	0.46	0.46
Thetford	Thetford	PRM		Box 5.3	224	116	82	40		43	50	116	17	40	0.34	0.52	0.19	P	0.43	0.43

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Thetford	2A6/02.1	DK	very rolled	39	f	0	0	n	2	3.22									
Thetford	2A6/02.2	F	slightly rolled	25	f	0	10	m	2	6.47		x							
Thetford	2A6/02.3	G	rolled	34	f	0	0	n	2	4.38									x
Thetford	2A6/02.4	FG	very rolled	48	f	0	0	n	2	2.4									x
Thetford	2A6/03.2	GK	very rolled	26	f	0	10	m	0	5.88									
Thetford	2A6/03.3	F	very fresh	35	f	0	0	n	2	2.79									x
Thetford	2A6/03.4	HK	very rolled	23	f	0	20	m	2	4.13									
Thetford	2A6/03.5	D	very rolled	30	p	0	10	a	0	4.5									
Thetford	2A6/04.1	M	rolled	42	p	0	10	a	0	4.01			x						x
Thetford	2A6/04.2	DF	very rolled	25	p	0	15	b	0	3.88									
Thetford	2A6/04.3	E	rolled	29	f	0	0	n	2	4.17									
Thetford	2A6/04.5	FG	rolled	27	f	0	15	m	2	3.72									
Thetford	2A6/07.1	M	very fresh	43	f	0	0	n	2	1.84		x	x						
Thetford	2A6/08.3	JK	slightly rolled	35	f	0	5	a	0	3.57									
Thetford	2A6/08.4	J	rolled	30	f	0	0	n	2	2.62									
Thetford	2A6/10.1	EF	very rolled	31	f	0	0	n	2	5.03									
Thetford	2A6/10.2	JK	slightly rolled	37	f	0	0	n	2	3.4	x								
Thetford	2A6/10.3	EF	slightly rolled	23	f	0	20	m	1	2.6									
Thetford	2A6/10.4	F	very rolled	23	f	0	0	n	1	3.33		x							
Thetford	2A6/10.5	E	very rolled	20	f	0	0	n	2	2.38									

Thetford	2A6/11.1	DF	rolled	19	f	0	0	n	2	4.12	x	x	
Thetford	Box 1.1	F	rolled	36	f	0	0	n	2				
Thetford	Box 1.2	M	very rolled	39	f	0	0	n	2				
Thetford	Box 1.4	E	very rolled	28	f	0	0	n	2				
Thetford	Box 1.5	K	slightly rolled	36	p	0	15	a	0				
Thetford	Box 2.1	EF	rolled	21	u	0	45	b	0				
Thetford	Box 2.2	DF	very rolled	34	f	0	5	m	2				
Thetford	Box 3.1	D	very rolled	35	p	0	5	b	2				
Thetford	Box 3.2	GK	rolled	20	p	0	20	a	1				
Thetford	Box 3.5	GK	slightly rolled	47	f	0	10	m	0				
Thetford	Box 4.1	J	rolled	27	f	0	0	n	2				
Thetford	Box 4.2	J	rolled	41	f	1	5	m	2				
Thetford	Box 4.4	H	very rolled	34	p	0	15	b	0				
Thetford	Box 4.6	J	slightly rolled	52	f	0	5	m	0				
Thetford	Box 5.1	F	rolled	41	f	0	10	b	0				
Thetford	Box 5.4	K	rolled	39	f	1	0	n	2				
Thetford	Box 6.2	F	rolled	34	p	0	25	b	0				
Thetford	Box 6.4	G	rolled	29	f	0	10	m	2				
Thetford	Box 6.5	EF	very rolled	37	f	0	5	m	0				
Thetford	Box 7.1	F	rolled	27	p	0	10	b	2				
Thetford	Box 7.2	F	rolled	29	f	0	5	m	1				
Thetford	Box 7.3	D	slightly rolled	30	p	0	5	b	2				
Thetford	Box 8.2	K	slightly rolled	29	f	0	0	n	1				
Thetford	2A6/08.1	HK	very rolled	31	f	0	15	m	0	5.43			x
Thetford	Box 4.5	K	slightly rolled	44	f	0	5	m	2				

Thetford	2A6/04.4	G	rolled	31	p	1	5	a	0	3.56	
Thetford	2A6/03.1	F	rolled	33	p	0	15	a	0	4.42	x
Thetford	2A6/08.2	D	very rolled	32	f	0	0	n	2	2.15	
Thetford	Box 5.2	FM	slightly rolled	47	p	0	15	a	0		
Thetford	Box 2.4	F	very rolled	42	f	0	0	n	2		
Thetford	Box 6.1	F	very rolled	57	f	0	5	m	2		
Thetford	Box 4.3	F	rolled	43	p	0	40	b	0		
Thetford	Box 7.4	G	very fresh	35	f	1	0	n	2		
Thetford	Box 2.5	D	very rolled	28	p	0	15	a	0		
Thetford	Box 8.1	F	rolled	41	f	0	0	n	2		
Thetford	Box 2.3	D	very fresh	26	p	1	25	b	0		
Thetford	Box 3.4	F	rolled	41	f	0	0	n	2		
Thetford	Box 1.6	M	rolled	49	f	0	10	m	2		
Thetford	Box 6.3	D	rolled	27	f	0	5	m	2		
Thetford	Box 1.3	F	rolled	47	p	0	10	b	1		
Thetford	Box 1.7	DK	rolled	48	f	1	15	m	2		
Thetford	Box 3.3	FM	very rolled	62	f	0	10	m	0		
Thetford	Box 5.3	FM	rolled	53	f	0	15	m	1		

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Twydall	Twydall	BM	Turner	1918.1	121	72	64	37	344.7	31	37	68	15	34	0.51	0.60	0.26	P	0.54	0.12
Twydall	Twydall	BM	Turner	1918.2	89	66	57	39	157.8	23	21	62	13	35	0.59	0.74	0.26	P	0.34	0.15
Twydall	Twydall	BM	Turner	1918.3	91	63	59	32	189.3	51	44	54	14	25	0.51	0.69	0.56	C	0.81	0.15
Twydall	Twydall	BM	Fenton	1921.1	109	70	61	52	299.1	44	37	52	11	47	0.74	0.64	0.40	O	0.71	0.10
Twydall	Twydall	BM	Burchell	1924.1	156	108	107	50	923.7	88	95	77	20	36	0.46	0.69	0.56	C	1.23	0.13
Twydall	Twydall	BM	Burchell	1947.1	96	64	58	38	192.4	29	38	57	14	22	0.59	0.67	0.30	P	0.67	0.15
Twydall	Twydall	BM	Burchell	1947.2	84	50	43	27	89.2	11	21	49	11	22	0.54	0.60	0.13	P	0.43	0.13
Twydall	Twydall	BM	Burchell	1947.3	99	61	49	29	139.9	18	26	61	8	21	0.48	0.62	0.18	P	0.43	0.08
Twydall	Twydall	BM	Burchell	1947.4	203	97	75	52	702.2	33	40	85	17	48	0.54	0.48	0.16	P	0.47	0.08
Twydall	Twydall	BM	Burchell	1947.5	145	91	91	35	423.2	73	60	74	14	27	0.38	0.63	0.50	O	0.81	0.10
Twydall	Twydall	AA		1947.68	97	61	58	22	109.6	25	33	56	9	18	0.36	0.63	0.26	P	0.59	0.09
Twydall	Twydall	BM	Burchell	1955.1	107	55	42	26	134	25	22	51	12	24	0.47	0.51	0.23	P	0.43	0.11
Twydall	Twydall	BM	Wellcome	4438.1	176	86	62	38	426.8	45	33	83	12	34	0.44	0.49	0.26	P	0.40	0.07
Twydall	Twydall	BM	Wellcome	4438.2	79	50	45	25	115.3	28	31	47	16	20	0.50	0.63	0.35	O	0.66	0.20
Twydall	Twydall	BM	Wellcome	4438.3	159	88	78	41	489.9	53	38	80	17	39	0.47	0.55	0.33	P	0.48	0.11
Twydall	Twydall	BM	Wellcome	4438.4	74	47	47	19	73.6	34	38	40	11	17	0.40	0.64	0.46	O	0.95	0.15
Twydall	Twydall	BM		6821.1	79	51	32	30	86.3	15	19	51	11	25	0.59	0.65	0.19	P	0.37	0.14
Twydall	Twydall	AA		1947.67.1	134	65	55	42	298.6	38	30	63	14	35	0.65	0.49	0.28	P	0.48	0.10
Twydall	Twydall	AA		1947.67.2	161	94	86	47	655.1	58	57	84	15	43	0.50	0.58	0.36	O	0.68	0.09
Twydall	Twydall	AA		1947.67.3	107	62	62	39	292.5	53	54	53	21	34	0.63	0.58	0.50	O	1.02	0.20
Twydall	Twydall	AA		1947.67.4	93	49	43	36	132.5	25	26	47	13	34	0.73	0.53	0.27	P	0.55	0.14
Twydall	Twydall	BM	Warren	1K14/21.1	117	63	57	42	223.7	48	32	53	13	38	0.67	0.54	0.41	O	0.60	0.11
Twydall	Twydall	BM	Warren	1K14/21.2	74	57	50	30	130.3	26	34	55	17	29	0.53	0.77	0.35	O	0.62	0.23
Twydall	Twydall	BM	Warren	1K14/21.3	85	63	55	33	172.8	23	40	56	13	26	0.52	0.74	0.27	P	0.71	0.15
Twydall	Twydall	BM	Warren	1K14/21.4	92	52	49	30	121.9	25	31	47	17	20	0.58	0.57	0.27	P	0.66	0.18

Twydall	Twydall	BM	Warren	1K14/21.5	107	69	55	34	229.2	27	29	67	12	28	0.49	0.64	0.25	P	0.43	0.11
Twydall	Twydall	BM	Warren	1K14/21.6	165	79	61	42	405.7	58	35	74	9	25	0.53	0.48	0.35	O	0.47	0.05
Twydall	Twydall	BM	Warren	1K14/21.7	119	62	43	30	179.1	20	30	60	14	30	0.48	0.52	0.17	P	0.50	0.12
Twydall	Twydall	BM	Warren	1K14/21.8	110	61	57	24	155.8	30	37	57	12	21	0.39	0.55	0.27	P	0.65	0.11
Twydall	Twydall	BM	Warren	1K14/22.1	116	78	65	43	367.3	39	41	70	15	27	0.55	0.67	0.34	P	0.59	0.13
Twydall	Twydall	BM	Warren	1K14/22.2	146	78	77	43	507.2	71	70	55	12	38	0.55	0.53	0.49	O	1.27	0.08
Twydall	Twydall	BM	Warren	1K14/22.3	141	90	59	39	329.3	30	37	89	10	40	0.43	0.64	0.21	P	0.42	0.07
Twydall	Twydall	BM	Warren	1K14/22.4	98	68	64	31	196.6	51	50	53	14	23	0.46	0.69	0.52	O	0.94	0.14
Twydall	Twydall	BM	Warren	1K14/22.5	165	97	84	48	678.5	59	49	81	17	45	0.49	0.59	0.36	O	0.60	0.10
Twydall	Twydall	BM	Warren	1K14/22.6	135	86	70	50	455.3	36	39	81	15	44	0.58	0.64	0.27	P	0.48	0.11
Twydall	Twydall	BM	Warren	1K14/23.1	127	60	52	41	238.7	46	32	42	12	31	0.68	0.47	0.36	O	0.76	0.09
Twydall	Twydall	BM	Warren	1K14/23.2	189	97	84	47	685.7	49	48	86	13	41	0.48	0.51	0.26	P	0.56	0.07
Twydall	Twydall	BM	Warren	1K14/23.3	99	55	50	26	123.8	32	30	51	10	26	0.47	0.56	0.32	P	0.59	0.10
Twydall	Twydall	BM	Warren	1K14/23.4	70	55	37	27	89.2	4	22	52	15	23	0.49	0.79	0.06	P	0.42	0.21
Twydall	Twydall	BM	Warren	1K14/23.5	117	62	49	32	173.6	25	28	54	11	31	0.52	0.53	0.21	P	0.52	0.09
Twydall	Twydall	BM	Warren	1K14/24.2	154	86	68	43	421.7	39	30	76	14	39	0.50	0.56	0.25	P	0.39	0.09
Twydall	Twydall	BM	Warren	1K14/24.3	171	97	72	40	555.9	29	42	97	17	33	0.41	0.57	0.17	P	0.43	0.10
Twydall	Twydall	BM	Warren	1K14/24.4	200	100	93	39	743.5	67	60	89	16	27	0.39	0.50	0.34	P	0.67	0.08

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Twydall	1918.1	FG	slightly rolled	18	p	0	60	a	0	4.25						x			
Twydall	1918.2	E	slightly rolled	15	p	0	40	a	0	6.35			x			x			
Twydall	1918.3	E	rolled	22	f	0	5	m	2	9.33									
Twydall	1921.1	GJ	very fresh	25	p	2	20	a	0	2.75		x							
Twydall	1924.1	H	very fresh	34	f	1	10	m	0	2.63									
Twydall	1947.1	J	slightly rolled	28	f	0	5	m	2	2.98	x								
Twydall	1947.2	F	slightly rolled	23	p	0	5	b	1	3.82									
Twydall	1947.3	F	slightly rolled	33	f	0	0	n	2	2.33									
Twydall	1947.4	F	slightly rolled	47	f	0	5	m	2	4.24							x	x	
Twydall	1947.5	GK	slightly rolled	36	f	1	10	m	0	4.33				x					
Twydall	1947.68	J	very fresh	33	f	1	25	m	1	6.99									
Twydall	1955.1	F	slightly rolled	25	f	0	0	n	1	4.06				x					
Twydall	4438.1	FM	very fresh	46	f	0	0	n	2	3.81									
Twydall	4438.2	E	very rolled	27	f	0	5	m	2	2.01									
Twydall	4438.3	F	slightly rolled	32	f	0	0	n	2	3.79	x	x							
Twydall	4438.4	K	slightly rolled	32	f	0	0	n	2	3.91									
Twydall	6821.1	FM	slightly rolled	23	f	0	5	m	2	3.51				x					
Twydall	1947.67.1	F	very fresh	32	p	1	30	b	0	6.66	x					x			
Twydall	1947.67.2	G	very fresh	57	u	0	25	a	0	4.16									
Twydall	1947.67.3	H	slightly rolled	48	f	0	15	m	2	4.02									

Twydall	1947.67.4	F	very fresh	32	u	0	20	b	0	3.45									
Twydall	1K14/21.1	FG	very fresh	20	u	0	10	b	1	4.27								x	
Twydall	1K14/21.2	E	rolled	16	u	0	15	b	0	3.8									
Twydall	1K14/21.3	E	very rolled	23	p	0	5	b	2	6.4		x							
Twydall	1K14/21.4	E	slightly rolled	15	f	0	0	n	1	4.95									
Twydall	1K14/21.5	F	rolled	33	f	0	0	n	2	3.21		x							
Twydall	1K14/21.6	F	very fresh	30	f	0	15	m	0	5.58	x							x	x
Twydall	1K14/21.7	F	very fresh	24	p	0	5	b	2	2.15									x
Twydall	1K14/21.8	DF	very fresh	29	f	0	0	n	2	4.25									
Twydall	1K14/22.1	FG	slightly rolled	27	p	0	5	b	2	3.32		x							
Twydall	1K14/22.2	H	very fresh	35	p	1	10	a	0	5.28									
Twydall	1K14/22.3	F	slightly rolled	35	f	0	0	n	2	4.97									
Twydall	1K14/22.4	K	very fresh	33	f	0	0	n	2	5.67								x	
Twydall	1K14/22.5	F	slightly rolled	39	f	0	10	m	2	6.39						x			
Twydall	1K14/22.6	F	slightly rolled	31	u	1	25	a	0	2.93				x					
Twydall	1K14/23.1	F	very fresh	24	p	0	10	b	1	14.25		x							
Twydall	1K14/23.2	FG	very fresh	43	f	0	0	n	1	2.75		x							
Twydall	1K14/23.3	J	very fresh	27	f	0	0	n	2	4.84									
Twydall	1K14/23.4	E	slightly rolled	11	u	0	45	b	0	3.88									
Twydall	1K14/23.5	F	slightly rolled	21	p	0	10	a	0	3.94	x					x			x
Twydall	1K14/24.2	F	slightly rolled	39	p	0	5	a	0	3.17									
Twydall	1K14/24.3	F	slightly rolled	27	p	0	30	a	1	3.05									
Twydall	1K14/24.4	FG	slightly rolled	32	f	0	0	n	1	2.82		x							

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional
Warsash	Warsash	AA		1958.323	141	85	80	37	466.7	62	57	83	21	30	0.44	0.60	0.44	o	0.69	0.15
Warsash	Warsash	AA		1958.339	90	60	47	33	147.1	30	26	46	11	26	0.55	0.67	0.33	p	0.57	0.12
Warsash	Warsash	AA		1976.108	142	87	86	47	620.9	94	74	76	20	40	0.54	0.61	0.66	c	0.97	0.14
Warsash	Warsash	AA		1976.288	167	102	72	41	557.9	35	41	98	14	32	0.40	0.61	0.21	p	0.42	0.08
Warsash	Warsash	AA		1976.407	135	90	84	34	409.5	41	47	82	13	30	0.38	0.67	0.30	p	0.57	0.10
Warsash	Warsash	AA		1976.408	83	52	52	19	95.9	45	35	47	12	17	0.37	0.63	0.54	o	0.74	0.14
Warsash	Warsash	AA		1976.365.1	115	78	77	36	348.3	75	63	23	16	62	0.46	0.68	0.65	c	2.74	0.14
Warsash	Warsash	AA		1976.365.2	117	71	69	37	309.9	29	39	65	15	35	0.52	0.61	0.25	p	0.60	0.13
Warsash	Warsash	AA		1976.365.3	137	81	77	34	407.1	56	54	72	14	34	0.42	0.59	0.41	o	0.75	0.10
Warsash	Warsash	AA		1976.365.4	148	95	69	49	523.9	15	40	91	17	43	0.52	0.64	0.10	p	0.44	0.11
Warsash	Warsash	AA		1976.365.5	95	58	47	34	163.4	19	26	57	18	31	0.59	0.61	0.20	p	0.46	0.19
Warsash	Warsash	AA		1976.365.6	116	65	56	28	223.2	26	29	58	14	28	0.43	0.56	0.22	p	0.50	0.12
Warsash	Warsash	AA		1976.365.8	136	98	77	41	543	39	53	90	21	37	0.42	0.72	0.29	p	0.59	0.15
Warsash	Warsash	AA		1976.365.9	65	48	35	18	53.3	19	17	47	8	16	0.38	0.74	0.29	p	0.36	0.12
Warsash	Warsash	AA		1976.366.4	133	67	62	38	296.3	39	36	63	17	29	0.57	0.50	0.29	p	0.57	0.13
Warsash	Warsash	AA		1976.405.1	156	100	96	51	710	56	69	76	17	46	0.51	0.64	0.36	o	0.91	0.11
Warsash	Warsash	AA		1976.405.2	89	69	55	28	160	17	32	68	12	27	0.41	0.78	0.19	p	0.47	0.13
Warsash	Warsash	AA		1976.405.3	128	77	70	41	323.3	82	64	59	13	26	0.53	0.60	0.64	c	1.08	0.10
Warsash	Warsash	AA		1976.405.4	122	80	76	34	405.4	97	72	55	13	27	0.43	0.66	0.80	c	1.31	0.11
Warsash	Warsash	AA		1976.405.5	177	111	73	45	816.5	31	39	110	22	45	0.41	0.63	0.18	p	0.35	0.12
Warsash	Warsash	AA		1976.405.6	164	93	84	38	654.9	50	51	82	19	41	0.41	0.57	0.30	p	0.62	0.12

Warsash	Warsash	AA		1976.406.2	110	92	88	25	250.6	49	75	75	9	25	0.27	0.84	0.45	o	1.00	0.08
Warsash	Warsash	AA		1976.565.1	193	100	78	59	819.3	29	50	100	13	55	0.59	0.52	0.15	p	0.50	0.07
Warsash	Warsash	AA		1976.565.2	162	92	68	39	572.1	39	49	76	21	36	0.42	0.57	0.24	p	0.64	0.13
Warsash	Warsash	BM	I.O.A	Box 1.2	180	99	79	59		52	58	87	17	58	0.60	0.55	0.29	p	0.67	0.09
Warsash	Warsash	BM	I.O.A	Box 1.3	132	79	64	47		34	42	76	17	40	0.59	0.60	0.26	p	0.55	0.13
Warsash	Warsash	BM	I.O.A	Box 1.4	166	92	90	59		103	76	71	17	42	0.64	0.55	0.62	c	1.07	0.10
Warsash	Warsash	BM	Modridge Coll	Box 10.1	262	132	125	57		110	101	116	35	47	0.43	0.50	0.42	o	0.87	0.13
Warsash	Warsash	BM	Modridge Coll	Box 11.1	150	90	76	58		30	37	90	16	58	0.64	0.60	0.20	p	0.41	0.11
Warsash	Warsash	BM	Modridge Coll	Box 11.2	192	131	129	48		94	112	99	28	38	0.37	0.68	0.49	o	1.13	0.15
Warsash	Warsash	BM	Modridge Coll	Box 11.3	154	60	58	52		68	47	52	18	42	0.87	0.39	0.44	o	0.90	0.12
Warsash	Warsash	BM	Modridge Coll	Box 12.1	128	68	54	33		22	37	68	13	29	0.49	0.53	0.17	p	0.54	0.10
Warsash	Warsash	BM	Modridge Coll	Box 12.2	161	95	91	41		72	71	78	18	25	0.43	0.59	0.45	o	0.91	0.11
Warsash	Warsash	BM	Modridge Coll	Box 12.3	155	118	113	63		88	94	107	32	53	0.53	0.76	0.57	c	0.88	0.21
Warsash	Warsash	BM	Modridge Coll	Box 12.4	140	95	83	48		38	52	88	26	42	0.51	0.68	0.27	p	0.59	0.19
Warsash	Warsash	BM	Modridge Coll	Box 13.1	135	89	83	29		52	63	73	18	20	0.33	0.66	0.39	o	0.86	0.13
Warsash	Warsash	BM	Modridge Coll	Box 13.2	156	89	88	35		72	67	70	21	34	0.39	0.57	0.46	o	0.96	0.13
Warsash	Warsash	BM	Modridge Coll	Box 13.3	141	100	98	40		56	70	94	20	40	0.40	0.71	0.40	o	0.74	0.14
Warsash	Warsash	BM	Modridge Coll	Box 13.4	171	76	74	49		89	65	56	13	36	0.64	0.44	0.52	o	1.16	0.08
Warsash	Warsash	BM	Modridge Coll	Box 14.1	124	85	85	30		63	57	70	17	26	0.35	0.69	0.51	o	0.81	0.14
Warsash	Warsash	BM	Modridge Coll	Box 14.2	139	99	95	37		66	65	84	14	35	0.37	0.71	0.47	o	0.77	0.10
Warsash	Warsash	BM	Modridge Coll	Box 14.3	139	103	101	41		66	64	86	13	31	0.40	0.74	0.47	o	0.74	0.09
Warsash	Warsash	BM	Modridge Coll	Box 14.4	136	93	80	49		38	61	86	18	39	0.53	0.68	0.28	p	0.71	0.13
Warsash	Warsash	BM	Modridge Coll	Box 14.5	131	83	78	34		38	46	76	16	31	0.41	0.63	0.29	p	0.61	0.12

Warsash	Warsash	BM	Modridge Coll	Box 15.1	171	88	76	42		45	41	80	22	33	0.48	0.51	0.26	p	0.51	0.13
Warsash	Warsash	BM	Modridge Coll	Box 15.2	152	76	71	41		49	39	51	17	26	0.54	0.50	0.32	p	0.76	0.11
Warsash	Warsash	BM	Modridge Coll	Box 15.3	130	56	50	39		48	41	49	16	37	0.70	0.43	0.37	o	0.84	0.12
Warsash	Warsash	BM	Modridge Coll	Box 15.4	129	87	66	34		36	34	84	12	27	0.39	0.67	0.28	p	0.40	0.09
Warsash	Warsash	BM	Modridge Coll	Box 15.5	141	80	67	29		41	42	71	15	23	0.36	0.57	0.29	p	0.59	0.11
Warsash	Warsash	BM	Modridge Coll	Box 15.6	130	61	47	29		22	31	60	14	28	0.48	0.47	0.17	p	0.52	0.11
Warsash	Warsash	BM	Modridge Coll	Box 16.1	155	90	67	42		21	41	88	15	39	0.47	0.58	0.14	p	0.47	0.10
Warsash	Warsash	BM	Modridge Coll	Box 16.2	134	67	46	29		25	26	66	6	28	0.43	0.50	0.19	p	0.39	0.04
Warsash	Warsash	BM	Modridge Coll	Box 16.3	135	89	58	31		17	30	83	16	31	0.35	0.66	0.13	p	0.36	0.12
Warsash	Warsash	BM	Modridge Coll	Box 16.4	170	95	78	43		44	52	88	15	37	0.45	0.56	0.26	p	0.59	0.09
Warsash	Warsash	BM	Modridge Coll	Box 16.5	156	73	56	41		56	34	65	18	35	0.56	0.47	0.36	o	0.52	0.12
Warsash	Warsash	BM	Modridge Coll	Box 17.1	208	109	75	42		57	46	105	13	37	0.39	0.52	0.27	p	0.44	0.06
Warsash	Warsash	BM	Modridge Coll	Box 17.2	225	94	67	47		44	36	94	14	47	0.50	0.42	0.20	p	0.38	0.06
Warsash	Warsash	BM	Modridge Coll	Box 18.1	95	58	39	38		22	21	55	14	34	0.66	0.61	0.23	p	0.38	0.15
Warsash	Warsash	BM	Modridge Coll	Box 18.2	126	88	85	35		40	71	74	20	26	0.40	0.70	0.32	p	0.96	0.16
Warsash	Warsash	BM	Modridge Coll	Box 18.3	248	118	87	44		52	58	116	20	44	0.37	0.48	0.21	p	0.50	0.08
Warsash	Warsash	BM	Modridge Coll	Box 18.4	88	54	41	31		13	20	54	14	29	0.57	0.61	0.15	p	0.37	0.16
Warsash	Warsash	BM	Modridge Coll	Box 19.1	145	90	86	39		48	77	70	16	31	0.43	0.62	0.33	p	1.10	0.11
Warsash	Warsash	BM	Modridge Coll	Box 19.2	166	91	88	42		76	59	69	17	29	0.46	0.55	0.46	o	0.86	0.10
Warsash	Warsash	BM	Modridge Coll	Box 19.3	113	68	58	30		27	29	66	8	25	0.44	0.60	0.24	p	0.44	0.07
Warsash	Warsash	BM	Modridge Coll	Box 19.4	91	71	64	31		49	60	65	18	25	0.44	0.78	0.54	o	0.92	0.20
Warsash	Warsash	BM	Modridge Coll	Box 19.5	162	95	88	39		96	85	79	23	31	0.41	0.59	0.59	c	1.08	0.14
Warsash	Warsash	BM	Modridge Coll	Box 19.6	108	74	67	26		26	47	71	16	23	0.35	0.69	0.24	p	0.66	0.15

Warsash	Warsash	BM	Geological Museum Collection	Box 2.1	159	92	69	48		41	43	79	21	41	0.52	0.58	0.26	p	0.54	0.13
Warsash	Warsash	BM	Geological Museum Collection	Box 2.2	136	57	52	27		71	54	51	20	27	0.47	0.42	0.52	o	1.06	0.15
Warsash	Warsash	BM	Modridge Coll	Box 20.1	122	63	57	34		39	33	55	13	26	0.54	0.52	0.32	p	0.60	0.11
Warsash	Warsash	BM	Modridge Coll	Box 20.2	182	100	97	45		93	80	73	29	29	0.45	0.55	0.51	o	1.10	0.16
Warsash	Warsash	BM	Modridge Coll	Box 20.3	169	96	86	52		58	54	84	17	49	0.54	0.57	0.34	p	0.64	0.10
Warsash	Warsash	BM	Modridge Coll	Box 20.4	115	74	73	38		35	58	71	16	39	0.51	0.64	0.30	p	0.82	0.14
Warsash	Warsash	BM	Modridge Coll	Box 20.5	140	91	87	37		46	56	75	17	27	0.41	0.65	0.33	p	0.75	0.12
Warsash	Warsash	BM	Modridge Coll	Box 21.1	107	69	65	30		36	49	54	20	25	0.43	0.64	0.34	p	0.91	0.19
Warsash	Warsash	BM	Modridge Coll	Box 21.2	121	77	69	37		35	34	72	15	31	0.48	0.64	0.29	p	0.47	0.12
Warsash	Warsash	BM	Modridge Coll	Box 21.3	129	79	65	45		34	41	71	19	31	0.57	0.61	0.26	p	0.58	0.15
Warsash	Warsash	BM	Modridge Coll	Box 21.4	94	57	55	24		40	33	50	17	18	0.42	0.61	0.43	o	0.66	0.18
Warsash	Warsash	BM	Modridge Coll	Box 21.5	129	62	52	31		27	37	61	15	26	0.50	0.48	0.21	p	0.61	0.12
Warsash	Warsash	BM	Modridge Coll	Box 21.6	105	72	72	35		49	53	60	23	19	0.49	0.69	0.47	o	0.88	0.22
Warsash	Warsash	BM	Modridge Coll	Box 21.7	112	57	48	29		29	25	52	13	25	0.51	0.51	0.26	p	0.48	0.12
Warsash	Warsash	BM	Modridge Coll	Box 21.8	106	64	63	21		53	38	50	17	20	0.33	0.60	0.50	o	0.76	0.16
Warsash	Warsash	BM	Modridge Coll	Box 21.9	108	53	45	34		20	24	52	12	29	0.64	0.49	0.19	p	0.46	0.11
Warsash	Warsash	BM	Modridge Coll	Box 22.1	96	59	56	25		25	29	49	10	17	0.42	0.61	0.26	p	0.59	0.10
Warsash	Warsash	BM	Modridge Coll	Box 22.10	135	84	55	40		25	31	83	17	37	0.48	0.62	0.19	p	0.37	0.13
Warsash	Warsash	BM	Modridge Coll	Box 22.2	60	52	49	24		20	24	42	10	19	0.46	0.87	0.33	p	0.57	0.17
Warsash	Warsash	BM	Modridge Coll	Box 22.3	68	50	46	21		19	32	41	10	14	0.42	0.74	0.28	p	0.78	0.15
Warsash	Warsash	BM	Modridge Coll	Box 22.4	84	39	33	28		21	17	37	10	23	0.72	0.46	0.25	p	0.46	0.12
Warsash	Warsash	BM	Modridge Coll	Box 22.5	160	78	62	37		29	31	73	15	33	0.47	0.49	0.18	p	0.42	0.09

Warsash	Warsash	BM	Modridge Coll	Box 22.6	70	46	41	17		26	34	39	10	12	0.37	0.66	0.37	o	0.87	0.14
Warsash	Warsash	BM	Modridge Coll	Box 22.7	136	75	53	42		24	32	74	15	42	0.56	0.55	0.18	p	0.43	0.11
Warsash	Warsash	BM	Modridge Coll	Box 22.8	143	82	76	46		61	39	73	20	32	0.56	0.57	0.43	o	0.53	0.14
Warsash	Warsash	BM	Modridge Coll	Box 22.9	144	73	43	35		19	28	71	10	32	0.48	0.51	0.13	p	0.39	0.07
Warsash	Warsash	BM	Modridge Coll	Box 23.1	105	64	49	24		27	28	58	12	22	0.38	0.61	0.26	p	0.48	0.11
Warsash	Warsash	BM	Modridge Coll	Box 23.10	83	61	50	25		9	19	59	9	23	0.41	0.73	0.11	p	0.32	0.11
Warsash	Warsash	BM	Modridge Coll	Box 23.11	73	56	54	24		15	35	53	15	16	0.43	0.77	0.21	p	0.66	0.21
Warsash	Warsash	BM	Modridge Coll	Box 23.12	87	54	51	25		26	39	45	16	21	0.46	0.62	0.30	p	0.87	0.18
Warsash	Warsash	BM	Modridge Coll	Box 23.13	85	61	56	27		21	34	54	14	16	0.44	0.72	0.25	p	0.63	0.16
Warsash	Warsash	BM	Modridge Coll	Box 23.2	101	55	47	23		32	28	43	12	18	0.42	0.54	0.32	p	0.65	0.12
Warsash	Warsash	BM	Modridge Coll	Box 23.3	97	47	24	25		12	16	45	10	18	0.53	0.48	0.12	p	0.36	0.10
Warsash	Warsash	BM	Modridge Coll	Box 23.4	96	51	47	27		36	30	44	15	16	0.53	0.53	0.38	o	0.68	0.16
Warsash	Warsash	BM	Modridge Coll	Box 23.5	92	49	44	25		34	22	46	10	28	0.51	0.53	0.37	o	0.48	0.11
Warsash	Warsash	BM	Modridge Coll	Box 23.6	109	56	33	27		21	22	56	12	27	0.48	0.51	0.19	p	0.39	0.11
Warsash	Warsash	BM	Modridge Coll	Box 23.7	75	58	55	25		29	38	53	12	19	0.43	0.77	0.39	o	0.72	0.16
Warsash	Warsash	BM	Modridge Coll	Box 23.8	81	53	30	20		6	23	46	10	17	0.38	0.65	0.07	p	0.50	0.12
Warsash	Warsash	BM	Modridge Coll	Box 23.9	87	47	42	34		18	27	43	13	33	0.72	0.54	0.21	p	0.63	0.15
Warsash	Warsash	BM	Modridge Coll	Box 24.1	114	84	78	37		26	50	75	21	34	0.44	0.74	0.23	p	0.67	0.18
Warsash	Warsash	BM	Modridge Coll	Box 24.2	153	81	64	43		47	34	73	18	38	0.53	0.53	0.31	p	0.47	0.12
Warsash	Warsash	BM	Modridge Coll	Box 24.3	144	64	60	37		53	39	59	19	36	0.58	0.44	0.37	o	0.66	0.13
Warsash	Warsash	BM	Modridge Coll	Box 24.4	158	72	61	44		48	36	60	22	37	0.61	0.46	0.30	p	0.60	0.14
Warsash	Warsash	BM	Modridge Coll	Box 24.5	190	88	87	51		84	56	61	32	30	0.58	0.46	0.44	o	0.92	0.17
Warsash	Warsash	BM	Modridge Coll	Box 24.6	98	59	45	27		20	25	59	12	19	0.46	0.60	0.20	p	0.42	0.12

Warsash	Warsash	BM	Modridge Coll	Box 24.7	82	48	44	25		28	31	46	11	18	0.52	0.59	0.34	p	0.67	0.13
Warsash	Warsash	BM	Modridge Coll	Box 25.1	135	96	94	43		85	84	62	22	39	0.45	0.71	0.63	c	1.35	0.16
Warsash	Warsash	BM	Modridge Coll	Box 25.2	136	78	78	39		67	62	65	17	31	0.50	0.57	0.49	o	0.95	0.13
Warsash	Warsash	BM	Modridge Coll	Box 25.3	153	89	67	32		37	41	83	18	26	0.36	0.58	0.24	p	0.49	0.12
Warsash	Warsash	BM	Modridge Coll	Box 25.4	101	77	68	32		33	36	69	15	29	0.42	0.76	0.33	p	0.52	0.15
Warsash	Warsash	BM	Modridge Coll	Box 26.1	253	112	64	51		43	38	112	18	37	0.46	0.44	0.17	p	0.34	0.07
Warsash	Warsash	BM	Modridge Coll	Box 26.2	208	100	68	53		43	38	97	14	42	0.53	0.48	0.21	p	0.39	0.07
Warsash	Warsash	BM	Modridge Coll	Box 27.1	190	103	65	47		36	38	102	17	46	0.46	0.54	0.19	p	0.37	0.09
Warsash	Warsash	BM	Modridge Coll	Box 27.2	138	91	75	48		29	57	90	15	42	0.53	0.66	0.21	p	0.63	0.11
Warsash	Warsash	BM	Modridge Coll	Box 27.3	211	102	80	51		44	43	100	13	44	0.50	0.48	0.21	p	0.43	0.06
Warsash	Warsash	BM	Modridge Coll	Box 27.4	140	63	55	37		36	35	61	12	35	0.59	0.45	0.26	p	0.57	0.09
Warsash	Warsash	BM	Modridge Coll	Box 28.1	217	108	66	55		40	41	108	17	44	0.51	0.50	0.18	p	0.38	0.08
Warsash	Warsash	BM	Modridge Coll	Box 28.2	166	87	75	39		38	41	83	16	32	0.45	0.52	0.23	p	0.49	0.10
Warsash	Warsash	BM	Modridge Coll	Box 28.3	104	64	50	23		25	27	59	11	22	0.36	0.62	0.24	p	0.46	0.11
Warsash	Warsash	BM	Modridge Coll	Box 28.4	147	68	58	33		44	40	63	17	25	0.49	0.46	0.30	p	0.63	0.12
Warsash	Warsash	BM	Modridge Coll	Box 29.1	116	60	47	34		38	26	50	15	30	0.57	0.52	0.33	p	0.52	0.13
Warsash	Warsash	BM	Modridge Coll	Box 29.2	163	67	63	44		91	53	55	27	43	0.66	0.41	0.56	c	0.96	0.17
Warsash	Warsash	BM	Modridge Coll	Box 29.3	113	75	63	38		32	30	67	19	24	0.51	0.66	0.28	p	0.45	0.17
Warsash	Warsash	BM	Modridge Coll	Box 29.4	112	84	79	31		60	48	71	16	25	0.37	0.75	0.54	o	0.68	0.14
Warsash	Warsash	BM	Modridge Coll	Box 29.5	152	121	113	42		50	56	93	21	34	0.35	0.80	0.33	p	0.60	0.14
Warsash	Warsash	BM	Modridge Coll	Box 29.6	139	95	87	28		43	54	86	16	26	0.29	0.68	0.31	p	0.63	0.12
Warsash	Warsash	BM	Geological Museum Collection	Box 3.1	154	76	71	31		38	44	56	15	31	0.41	0.49	0.25	p	0.79	0.10

Warsash	Warsash	B M	Geological Museum Collection	Box 3.2	213	96	69	45		49	39	94	17	41	0.47	0.45	0.23	p	0.41	0.08
Warsash	Warsash	B M	Modridge Coll	Box 30.1	101	62	49	30		31	23	57	8	17	0.48	0.61	0.31	p	0.40	0.08
Warsash	Warsash	B M	Modridge Coll	Box 30.2	97	59	48	15		16	25	58	12	10	0.25	0.61	0.16	p	0.43	0.12
Warsash	Warsash	B M	Modridge Coll	Box 30.3	140	74	72	37		57	52	58	19	32	0.50	0.53	0.41	o	0.90	0.14
Warsash	Warsash	B M	Modridge Coll	Box 30.4	122	82	75	50		46	60	62	17	44	0.61	0.67	0.38	o	0.97	0.14
Warsash	Warsash	B M	Modridge Coll	Box 30.5	149	85	83	29		37	65	75	22	23	0.34	0.57	0.25	p	0.87	0.15
Warsash	Warsash	B M	Modridge Coll	Box 30.6	140	86	84	47		73	65	65	25	42	0.55	0.61	0.52	o	1.00	0.18
Warsash	Warsash	B M	Modridge Coll	Box 31.1	151	95	83	36		38	45	90	14	33	0.38	0.63	0.25	p	0.50	0.09
Warsash	Warsash	B M	Mrs Young	Box 32.1	184	123	99	38		48	65	113	19	38	0.31	0.67	0.26	p	0.58	0.10
Warsash	Warsash	B M	Dewey	Box 4.1	110	62	41	27		23	24	60	10	23	0.44	0.56	0.21	p	0.40	0.09
Warsash	Warsash	B M	Edwardson	Box 5.1	178	125	123	35		63	87	119	23	36	0.28	0.70	0.35	o	0.73	0.13
Warsash	Warsash	B M	Codrington	Box 6.1	163	78	46	42		39	26	69	11	41	0.54	0.48	0.24	p	0.38	0.07
Warsash	Warsash	B M	I.O.A	Box 7.1	154	113	106	59		53	73	89	29	52	0.52	0.73	0.34	p	0.82	0.19
Warsash	Warsash	B M	I.O.A	Box 7.2	107	73	69	25		37	50	66	16	16	0.34	0.68	0.35	p	0.76	0.15
Warsash	Warsash	B M	I.O.A	Box 7.3	135	84	82	41		60	52	63	33	24	0.49	0.62	0.44	o	0.83	0.24
Warsash	Warsash	B M	I.O.A	Box 8.1	134	89	83	47		67	54	77	19	40	0.53	0.66	0.50	o	0.70	0.14
Warsash	Warsash	B M	I.O.A	Box 8.2	101	76	72	41		28	44	72	18	37	0.54	0.75	0.28	p	0.61	0.18
Warsash	Warsash	B M	I.O.A	Box 8.3	114	72	71	28		54	55	59	13	22	0.39	0.63	0.47	o	0.93	0.11
Warsash	Warsash	B M	I.O.A	Box 8.4	135	82	81	36		60	52	74	22	22	0.44	0.61	0.44	o	0.70	0.16
Warsash	Warsash	B M	I.O.A	Box 9.1	101	86	67	40		65	71	44	19	37	0.47	0.85	0.64	c	1.61	0.19
Warsash	Warsash	B M	I.O.A	Box1.1	134	77	66	47		49	37	60	25	45	0.61	0.57	0.37	o	0.62	0.19
Warsash	Warsash	AA		Z31294	161	90	79	46	544.2	55	43	69	16	43	0.51	0.56	0.34	p	0.62	0.10

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Warsash	1958.323	F	very rolled	50	f	0	0	n	2	3.62									x
Warsash	1958.339	E	very fresh	30	p	0	10	b	2	2.95									
Warsash	1976.108	H	slightly rolled	52	f	1	15	a	0	6.68						x			
Warsash	1976.288	F	very rolled	40	f	0	0	n	1	4.79			x						
Warsash	1976.407	J	slightly rolled	24	p	0	15	a	1	3.65									
Warsash	1976.408	E	very rolled	28	f	0	0	n	2	4.89									
Warsash	1976.365.1	H	slightly rolled	53	f	0	5	m	0	2.78									
Warsash	1976.365.2	G	slightly rolled	60	f	0	10	m	2	6.44				x					
Warsash	1976.365.3	GJ	slightly rolled	51	f	0	10	m	0	4.9									
Warsash	1976.365.4	FM	rolled	37	f	0	0	n	2	6.25									x
Warsash	1976.365.5	EF	rolled	33	f	0	0	n	2	4.01									
Warsash	1976.365.6	F	slightly rolled	47	p	0	5	b	2	1.96									
Warsash	1976.365.8	F	very rolled	50	f	0	0	n	2	4.69									x
Warsash	1976.365.9	E	very rolled	29	f	0	15	m	2	2.12									
Warsash	1976.366.4	F	slightly rolled	44	f	0	20	m	1	6.12									
Warsash	1976.405.1	GH	slightly rolled	42	f	0	15	m	0	5.72									
Warsash	1976.405.2	EF	slightly rolled	34	u	0	30	b	0	3.6									
Warsash	1976.405.3	H	rolled	40	p	1	20	a	0	4.02						x			
Warsash	1976.405.4	H	very fresh	43	f	1	10	m	2	4.49									
Warsash	1976.405.5	F	very rolled	55	f	0	10	m	2	3.05									

Warsash	1976.405.6	FG	rolled	59	f	0	15	m	2	1.97							x		
Warsash	1976.406.2	HK	very fresh	36	f	0	0	n	1	3.63		x							
Warsash	1976.565.1	FG	slightly rolled	60	p	0	20	b	0	2.47			x						
Warsash	1976.565.2	G	very rolled	59	f	0	5	m	2	2.95			x						
Warsash	Box 1.2	F	slightly rolled	37	f	0	0	n	2	4.11									x
Warsash	Box 1.3	F	very rolled	33	p	0	10	b	2	2.57									
Warsash	Box 1.4	D	rolled	33	f	1	10	m	2	3.6									
Warsash	Box 10.1	GK	slightly rolled	78	f	0	20	m	0	3.02									
Warsash	Box 11.1	F	rolled	32	u	0	25	b	0	2.65									x
Warsash	Box 11.2	HK	very rolled	39	f	1	5	m	2	5.09									
Warsash	Box 11.3	K	slightly rolled	38	u	0	50	b	0	5.82						x			
Warsash	Box 12.1	F	rolled	44	f	0	0	n	1	5.46									
Warsash	Box 12.2	K	slightly rolled	59	f	0	0	n	2	2.62									
Warsash	Box 12.3	H	rolled	26	u	1	20	b	0	4.79									
Warsash	Box 12.4	DF	very rolled	45	f	0	0	n	2	3.27			x						
Warsash	Box 13.1	HK	rolled	43	f	1	0	n	1	3.1									
Warsash	Box 13.2	K	very rolled	38	f	0	0	n	2	2.82									
Warsash	Box 13.3	GH	rolled	46	p	0	20	a	0	2.72									
Warsash	Box 13.4	K	very fresh	39	f	0	15	m	0	3.8									
Warsash	Box 14.1	K	rolled	48	f	1	0	n	2	4.6							x		
Warsash	Box 14.2	GJ	very fresh	46	f	1	5	m	2	2.99									
Warsash	Box 14.3	GJ	slightly rolled	44	p	0	5	b	2	2.63									
Warsash	Box 14.4	G	slightly rolled	45	p	1	10	b	2	4.96									
Warsash	Box 14.5	GJ	very rolled	37	f	0	0	n	2	3.84									
Warsash	Box 15.1	F	rolled	37	f	0	0	n	1	3.37									

Warsash	Box 15.2	F	rolled	35	u	0	40	a	0	7.89								
Warsash	Box 15.3	D	rolled	31	p	0	40	a	0	4.52								
Warsash	Box 15.4	F	slightly rolled	47	f	0	0	n	2	2.68								
Warsash	Box 15.5	F	rolled	30	f	0	5	m	1	1.81								
Warsash	Box 15.6	F	rolled	36	f	0	0	n	2	6.5		x						
Warsash	Box 16.1	DF	rolled	42	p	0	30	a	0	3.62		x						
Warsash	Box 16.2	F	very fresh	46	p	0	5	b	2	2.19								
Warsash	Box 16.3	F	very rolled	43	f	0	15	m	0	4.97		x						
Warsash	Box 16.4	F	slightly rolled	46	p	0	40	a	0	4.36								
Warsash	Box 16.5	F	rolled	40	u	0	40	b	0	2.85						x		
Warsash	Box 17.1	F	slightly rolled	64	f	0	10	m	2	2.69								
Warsash	Box 17.2	F	slightly rolled	54	f	0	10	m	0	2.59								
Warsash	Box 18.1	EF	rolled	24	f	0	0	n	2	3.39								
Warsash	Box 18.2	H	rolled	36	f	1	0	n	2	4.4								
Warsash	Box 18.3	F	rolled	53	p	0	10	b	0	2.04		x						
Warsash	Box 18.4	F	rolled	22	f	0	5	m	2	5.15								
Warsash	Box 19.1	H	rolled	34	p	1	15	a	0	6.5								
Warsash	Box 19.2	K	slightly rolled	38	f	1	0	n	2	1.77								
Warsash	Box 19.3	J	slightly rolled	37	p	0	10	b	2	4.62								
Warsash	Box 19.4	K	very rolled	27	f	1	0	n	2	3.02								
Warsash	Box 19.5	HK	rolled	47	f	1	0	n	2	7.04								
Warsash	Box 19.6	F	rolled	26	p	0	10	a	2	7.31								
Warsash	Box 2.1	FM	very rolled	33	p	0	20	b	2	3.51		x						x
Warsash	Box 2.2	D	rolled	16	u	0	75	a	0	11.57					x			
Warsash	Box 20.1	FG	rolled	27	f	0	0	n	1	2.05	x							
Warsash	Box 20.2	K	very rolled	47	p	1	10	a	0	2.65								
Warsash	Box 20.3	G	rolled	45	f	0	10	m	0	3.39								

Warsash	Box 20.4	D	rolled	23	p	0	50	b	0	3.79				x
Warsash	Box 20.5	G	very rolled	39	p	1	40	b	0	5.78				x
Warsash	Box 21.1	K	very rolled	20	f	0	0	n	2	4.65				
Warsash	Box 21.2	DF	very rolled	28	p	0	40	a	0	4.89				
Warsash	Box 21.3	DF	rolled	13	p	0	80	a	0	4.01				
Warsash	Box 21.4	E	very rolled	15	u	0	65	a	0	4.21				
Warsash	Box 21.5	F	very rolled	31	p	0	25	b	2	3.59		x		
Warsash	Box 21.6	K	very rolled	32	f	1	0	n	2	2.28				
Warsash	Box 21.7	DF	slightly rolled	20	p	0	35	a	2	5.81				
Warsash	Box 21.8	DK	very rolled	27	f	0	15	m	2	3.52				
Warsash	Box 21.9	F	rolled	29	u	0	20	b	2	15.29				
Warsash	Box 22.1	EF	rolled	27	f	0	0	n	2	7.39				
Warsash	Box 22.10	DF	very rolled	30	p	0	25	a	0	3.82				
Warsash	Box 22.2	K	rolled	26	u	1	20	b	0	5.41				
Warsash	Box 22.3	JK	rolled	33	f	1	0	n	2	3.66			x	
Warsash	Box 22.4	E	very rolled	23	p	0	25	b	0	3.87				
Warsash	Box 22.5	F	slightly rolled	47	p	0	10	b	2	3.23				
Warsash	Box 22.6	HK	rolled	30	f	0	0	n	2	8.07				
Warsash	Box 22.7	F	very rolled	30	p	0	5	b	2	4.15				
Warsash	Box 22.8	FG	rolled	46	f	0	0	n	2	2.26				
Warsash	Box 22.9	F	rolled	32	p	0	55	a	0	5.62	x			
Warsash	Box 23.1	F	slightly rolled	33	p	0	10	b	2	2.54				
Warsash	Box 23.10	J	very rolled	27	f	0	5	m	2	2.12				
Warsash	Box 23.11	K	very rolled	36	f	0	0	n	2	1.94			x	
Warsash	Box 23.12	K	very rolled	37	f	0	0	n	2	4.83				

Warsash	Box 23.13	J	slightly rolled	30	f	1	0	n	2	4.27	x								
Warsash	Box 23.2	EF	rolled	27	f	0	5	m	2	7.26									
Warsash	Box 23.3	EF	rolled	26	f	0	0	n	2	2.4			x						
Warsash	Box 23.4	E	slightly rolled	25	f	0	0	n	2	7									
Warsash	Box 23.5	EF	slightly rolled	21	p	0	10	b	2	4.9									
Warsash	Box 23.6	F	rolled	29	f	0	0	n	2	6.57	x								
Warsash	Box 23.7	K	very rolled	26	f	0	0	n	2	2.53					x				
Warsash	Box 23.8	E	very rolled	23	f	0	20	m	2	5.88									x
Warsash	Box 23.9	EF	rolled	27	p	0	5	b	2	2.4									
Warsash	Box 24.1	GJ	rolled	44	f	0	0	n	2	6.59									
Warsash	Box 24.2	FM	very rolled	34	f	0	0	n	2	2.75			x						
Warsash	Box 24.3	D	rolled	36	p	0	10	b	2	2.69									
Warsash	Box 24.4	DF	very rolled	31	p	0	60	a	0	3.87									
Warsash	Box 24.5	DK	rolled	39	f	0	0	n	2	6.48									
Warsash	Box 24.6	EF	rolled	40	f	0	0	n	2	4.45									
Warsash	Box 24.7	E	rolled	23	f	0	5	m	2	4.08								x	
Warsash	Box 25.1	H	slightly rolled	38	u	1	30	b	0	6.42									
Warsash	Box 25.2	D	very rolled	22	u	1	20	b	0	9.36									x
Warsash	Box 25.3	F	very rolled	42	u	0	15	b	0	5.31									
Warsash	Box 25.4	J	very rolled	32	f	0	5	m	0	7.1	x								
Warsash	Box 26.1	M	slightly rolled	71	f	0	5	m	0	2.19			x						
Warsash	Box 26.2	F	slightly rolled	55	p	0	10	a	0	4.33									
Warsash	Box 27.1	FM	slightly rolled	42	p	0	10	b	0	3.57	x								
Warsash	Box 27.2	J	very fresh	44	p	0	15	b	2	3.88									
Warsash	Box 27.3	F	slightly rolled	68	f	0	5	m	2	2.67				x					

Warsash	Box 27.4	FG	very fresh	35	f	1	0	n	2	2.86						
Warsash	Box 28.1	F	rolled	61	p	0	5	b	0	3.09						
Warsash	Box 28.2	FM	very rolled	42	f	0	20	m	2	2.6	x					
Warsash	Box 28.3	DF	rolled	31	p	0	20	b	0	4.55						
Warsash	Box 28.4	GK	rolled	40	f	0	5	m	0	4.86						
Warsash	Box 29.1	D	very rolled	31	u	0	40	b	0	3.68	x					
Warsash	Box 29.2	L	rolled	32	u	0	30	a	0	10.99						
Warsash	Box 29.3	GJ	very rolled	23	p	0	20	a	0	3.02						
Warsash	Box 29.4	JK	rolled	37	f	1	5	m	2	8.9						
Warsash	Box 29.5	GJ	slightly rolled	30	p	0	10	b	1	3.31						
Warsash	Box 29.6	J	rolled	44	f	1	0	n	2	2.79						
Warsash	Box 3.1	F	slightly rolled	27	f	0	5	b	1	3.25		x				
Warsash	Box 3.2	F	rolled	59	p	1	5	b	2	3.01						
Warsash	Box 30.1	F	slightly rolled	31	f	0	0	n	1	2.15						
Warsash	Box 30.2	F	rolled	29	f	0	0	n	1	5.62						
Warsash	Box 30.3	DK	very rolled	32	f	1	0	n	2	7.07						
Warsash	Box 30.4	HK	slightly rolled	25	p	1	35	a	0	5.62						x
Warsash	Box 30.5	GK	very rolled	32	f	0	20	m	2	1.98						
Warsash	Box 30.6	H	very rolled	42	p	1	25	a	0	5.04						
Warsash	Box 31.1	FG	very fresh	21	f	0	0	n	1	2.16						
Warsash	Box 32.1	GJ	slightly rolled	48	f	1	5	m	2	2.78						
Warsash	Box 4.1	EF	very fresh	38	f	0	5	m	0	3.4						
Warsash	Box 5.1	H	rolled	41	p	1	5	a	0	3.29						
Warsash	Box 6.1	M	rolled	44	u	0	20	b	0	3.19			x			
Warsash	Box 7.1	DK	very rolled	19	f	0	10	m	2	3.81						

Warsash	Box 7.2	D	very rolled	27	f	0	0	n	2	7.25
Warsash	Box 7.3	DK	very rolled	28	f	0	10	m	2	6.8
Warsash	Box 8.1	D	slightly rolled	31	f	0	35	a	0	3.46
Warsash	Box 8.2	E	very rolled	27	p	0	30	b	0	9.77
Warsash	Box 8.3	K	very rolled	24	f	0	5	a	2	6.54
Warsash	Box 8.4	G	very rolled	33	f	0	10	m	0	3.95
Warsash	Box 9.1	H	very rolled	17	f	0	25	m	1	3.82
Warsash	Box1.1	DF	rolled	34	p	0	15	a	0	3.72
Warsash	Z31294	F	rolled	39	p	0	20	b	0	2.72

aSite	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.13	176	92	88	47		52	65	80	23	40	0.51	0.52	0.30	P	0.81	0.27
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box340.3	77	39	38	31		32	24	35	12	29	0.79	0.51	0.42	O	0.69	0.40
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.20	98	52	47	26		26	28	48	10	25	0.50	0.53	0.27	P	0.58	0.27
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.4	99	40	37	38		36	24	41	14	33	0.95	0.40	0.36	O	0.59	0.38
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.9	101	67	51	36		20	31	67	22	31	0.54	0.66	0.20	P	0.46	0.36
Wolvercote	Drift	PRM	A.M. Bell	Box342.14	46	45	39	22		11	24	40	9	20	0.49	0.98	0.24	P	0.60	0.48
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box340.6	50	43	41	18		19	29	41	8	15	0.42	0.86	0.38	O	0.71	0.36
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.9	71	47	42	21		26	27	38	12	23	0.45	0.66	0.37	O	0.71	0.30
Wolvercote	Surface find	PRM	A.M. Bell	Box342.11	77	65	60	30		23	43	64	22	26	0.46	0.84	0.30	P	0.67	0.39
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.3	79	44	44	24		40	29	30	11	17	0.55	0.56	0.51	O	0.97	0.30
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.15	82	66	64	28		39	43	56	16	23	0.42	0.80	0.48	O	0.77	0.34
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.10	86	54	44	33		24	25	51	17	31	0.61	0.63	0.28	P	0.49	0.38
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.17	87	69	61	37		17	32	65	18	39	0.54	0.79	0.20	P	0.49	0.43
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.19	87	66	63	31		24	34	58	12	24	0.47	0.76	0.28	P	0.59	0.36
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.7	88	59	54	31		21	27	56	21	25	0.53	0.67	0.24	P	0.48	0.35
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.18	92	68	64	31		36	42	65	17	30	0.46	0.74	0.39	O	0.65	0.34
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.4	96	63	47	37		19	26	62	13	38	0.59	0.66	0.20	P	0.42	0.39
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box340.4	97	46	44	21		27	31	30	17	18	0.46	0.47	0.28	P	1.03	0.22
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.13	99	62	56	28		15	30	61	10	28	0.45	0.63	0.15	P	0.49	0.28
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.16	100	74	67	31		34	35	65	15	22	0.42	0.74	0.34	P	0.54	0.31

Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.10	107	66	51	37		27	25	57	14	30	0.56	0.62	0.25	P	0.44	0.35
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.6	107	65	55	30		29	34	65	12	23	0.46	0.61	0.27	P	0.52	0.28
Wolvercote	River bed	PRM	A.M. Bell	Box342.3	109	75	65	38		30	32	72	16	34	0.51	0.69	0.28	P	0.44	0.35
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.12	109	84	65	37		20	41	78	21	32	0.44	0.77	0.18	P	0.53	0.34
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box340.5	111	67	63	30		41	37	63	15	24	0.45	0.60	0.37	O	0.59	0.27
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.1	112	63	55	29		23	26	60	10	23	0.46	0.56	0.21	P	0.43	0.26
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.11	114	68	49	42		29	24	65	13	37	0.62	0.60	0.25	P	0.37	0.37
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.8	114	62	55	35		22	22	59	12	28	0.56	0.54	0.19	P	0.37	0.31
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.6	118	76	68	29		31	35	73	14	24	0.38	0.64	0.26	P	0.48	0.25
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.7	120	67	52	37		34	28	52	16	34	0.55	0.56	0.28	P	0.54	0.31
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.14	120	99	89	38		32	54	87	15	27	0.38	0.83	0.27	P	0.62	0.32
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.2	120	66	58	31		29	30	61	15	28	0.47	0.55	0.24	P	0.49	0.26
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box340.2	121	54	39	28		20	25	52	10	27	0.52	0.45	0.17	P	0.48	0.23
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.8	122	80	74	50		28	53	69	23	42	0.63	0.66	0.23	P	0.77	0.41
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.15	132	78	54	35		19	26	77	9	33	0.45	0.59	0.14	P	0.34	0.27
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.2	140	94	86	29		46	54	81	13	24	0.31	0.67	0.33	P	0.67	0.21
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.5	167	93	80	34		40	43	89	16	28	0.37	0.56	0.24	P	0.48	0.20
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.5	168	79	66	25		49	39	68	15	21	0.32	0.47	0.29	P	0.57	0.15
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box340.1	187	90	72	36		52	36	83	16	35	0.40	0.48	0.28	P	0.43	0.19
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box341.12	209	113	102	44		34	63	99	15	40	0.39	0.54	0.16	P	0.64	0.21
Wolvercote	Wolvercote Quarry	PRM	A.M. Bell	Box342.1	217	97	85	35		68	54	92	17	28	0.36	0.45	0.31	P	0.59	0.16

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Wolvercote	Box341.13	FG	slightly rolled	80	p	0	15	a	2	2.99									x
Wolvercote	Box340.3	F	slightly rolled	28	u	0	40	b	0	8.91	x					x			
Wolvercote	Box342.20	F	very fresh	24	f	1	0	n	2	3.09						x			
Wolvercote	Box341.4	F	slightly rolled	29	p	0	20	a	0	5.01						x			
Wolvercote	Box341.9	F	slightly rolled	40	f	0	0	n	1	4.54									x
Wolvercote	Box342.14	E	very fresh	25	p	0	10	b	2	5.78									
Wolvercote	Box340.6	E	very fresh	21	p	0	40	a	0	6.42									
Wolvercote	Box342.9	E	slightly rolled	33	p	0	15	a	2	9.74									
Wolvercote	Box342.11	GK	slightly rolled	27	f	0	0	n	2	5.13									
Wolvercote	Box341.3	J	very fresh	31	f	1	0	n	1	5.99	x							x	
Wolvercote	Box342.15	GJ	very rolled	41	f	0	0	n	2	5.17									
Wolvercote	Box342.10	EF	very rolled	20	u	0	35	b	0	2.89									
Wolvercote	Box342.17	DF	very rolled	22	p	0	10	b	2	8.75	x								
Wolvercote	Box342.19	GJ	slightly rolled	47	f	0	0	n	2	4.15		x							
Wolvercote	Box342.7	FG	slightly rolled	41	f	0	0	n	2	5.48	x								
Wolvercote	Box342.18	E	very rolled	15	p	0	35	a	1	3.84		x							
Wolvercote	Box342.4	F	rolled	35	f	0	0	n	2	5.82	x						x		
Wolvercote	Box340.4	F	slightly rolled	38	f	0	5	m	2	7.66	x							x	
Wolvercote	Box342.13	F	slightly rolled	43	f	0	0	n	1	3.04		x							
Wolvercote	Box342.16	F	slightly rolled	21	p	0	25	a	2	5.1									

Wolvercote	Box341.10	F	very fresh	40	f	0	0	n	1	6.26	x		x
Wolvercote	Box342.6	F	slightly rolled	23	p	1	10	b	1	2.14			
Wolvercote	Box342.3	F	very fresh	24	p	0	10	b	2	2.44		x	
Wolvercote	Box342.12	F	slightly rolled	19	p	0	25	b	1	2.2			
Wolvercote	Box340.5	J	very fresh	54	f	1	0	a	2	6.23	x		x
Wolvercote	Box341.1	FG	very fresh	41	p	0	10	a	0	3.36			
Wolvercote	Box341.11	FM	very fresh	38	f	0	0	n	2	5.69			
Wolvercote	Box342.8	FM	slightly rolled	46	f	0	0	n	2	4.76	x		x
Wolvercote	Box341.6	F	very fresh	35	f	0	0	n	2	2.64			
Wolvercote	Box341.7	M	slightly rolled	44	p	0	5	m	2	3.22			
Wolvercote	Box341.14	GJ	rolled	40	f	0	10	m	0	4.75			
Wolvercote	Box342.2	F	slightly rolled	55	p	0	15	b	2	5.52	x	x	
Wolvercote	Box340.2	FM	slightly rolled	52	f	0	0	n	2	2.45		x	
Wolvercote	Box341.8	G	slightly rolled	33	p	0	10	b	2	2.25			
Wolvercote	Box341.15	F	very fresh	54	f	1	5	m	2	2.88		x	
Wolvercote	Box341.2	GH	very fresh	54	f	1	0	n	2	1.76			
Wolvercote	Box341.5	F	slightly rolled	63	f	0	0	n	1	3.42		x	
Wolvercote	Box342.5	F	very fresh	57	p	0	15	a	0	2.72		x	
Wolvercote	Box340.1	FM	slightly rolled	65	f	0	0	n	1	3.17			
Wolvercote	Box341.12	FG	very fresh	81	f	0	0	n	1	3.35		x	
Wolvercote	Box342.1	F	slightly rolled	74	p	0	10	a	0	4.08		x	

Site	Area	Museum	Collection	Location reference.	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Planform shape	Tip shape (B1/B2)	Cross-sectional uniformity
Acton	Acton High Terrace Gravel	PRM		53.1	96	63	56	28		27	29	60	12	25	0.44	0.29	0.28	p	0.48	0.48
Acton	Ealing Dean	PRM	ALF	54.1	102	68	55	37		26	31	65	18	30	0.54	0.36	0.25	p	0.48	0.60
Acton	East Acton	PRM	Pitt Rivers	57.3	114	76	69	31		29	45	69	22	30	0.41	0.27	0.25	p	0.65	0.73
Acton	Acton Church Field	PRM	Pitt Rivers	57.2	119	79	53	40		41	32	59	17	32	0.51	0.34	0.34	p	0.54	0.53
Acton	Acton High Terrace Gravel	PRM	Pitt Rivers	53.2	121	76	73	37		22	61	73	19	37	0.49	0.31	0.18	p	0.84	0.51
Acton	Acton Church Field	PRM		57.5	141	73	50	44		39	31	68	23	33	0.60	0.31	0.28	p	0.46	0.70
Acton	Acton High Terrace Gravel	PRM	Pitt Rivers	57.4	157	96	76	50		52	42	84	32	37	0.52	0.32	0.33	p	0.50	0.86
Belhus Park	Belhus Park	BM		ID2/01.1	220	108	82	43		66	48	108	23	34	0.40	0.20	0.30	p	0.44	0.68
Belhus Park	Belhus Park	BM		ID2/01.2	99	62	59	34		31	51	54	11	29	0.55	0.34	0.31	p	0.94	0.38
Sonning	Sonning Churchyard	ROM	Treacher	AD114	82	57	50	29	129.1	27	27	47	14	26	0.51	0.70	0.33	p	0.57	0.54
Sonning	Sonning	AA		1925.24A	91	67	54	30	158.1	24	29	63	11	26	0.45	0.74	0.26	p	0.46	0.42
Sonning	Sonning	AA		Z29266	92	64	59	34	173.2	30	40	49	19	27	0.53	0.70	0.33	p	0.82	0.70
Sonning	Sonning Hill	ROM	Treacher	AD99	104	75	72	29	263.8	40	45	64	20	23	0.39	0.72	0.38	o	0.70	0.87
Sonning	Sonning Hill	ROM	Treacher	AD440	119	79	74	29	311.1	46	49	68	21	26	0.37	0.66	0.39	o	0.72	0.81
Sonning	Sonning Hill	ROM	Treacher	AD824	147	82	78	39	483.6	47	51	65	15	33	0.48	0.56	0.32	p	0.78	0.45
Sonning	Sonning Hill	ROM	Treacher	AD636	165	102	93	39	613.8	76	56	71	20	32	0.38	0.62	0.46	o	0.79	0.63
Sonning	Sonning Cutting	ROM	Treacher	AD784	169	94	75	42	550	45	38	90	13	33	0.45	0.56	0.27	p	0.42	0.39

Sonning	Sonning	ROM	Treacher	AD234	172	81	77	47	291.7	64	56	69	16	45	0.58	0.47	0.37	o	0.81	0.36
Southacre	Southacre	AA		62.264.2	171	87	76	38	520.1	49	43	83	17	35	0.44	0.51	0.29	p	0.52	0.49
Southacre	Southacre	AA		62.264.1	178	84	66	47	605.6	34	44	83	19	34	0.56	0.47	0.19	p	0.53	0.56

Site	Location reference.	Type	Condition	Removals	Intensity of butt working	Tranchet	Retained cortex (%)	Position of cortex	Blank	Index of symmetry	Lop-sided	Plano-convex	Biconcave edges	Concave on one edge only	Twisted profile	Grip	Notched	Méplat	Broken
Acton	53.1	J	very rolled	42	f	0	0	n	2	4.41									
Acton	54.1	F	very rolled	32	p	0	20	a	0	2.66									
Acton	57.3	D	very rolled	31	f	0	0	n	2	4.91									
Acton	57.2	F	very rolled	39	f	0	0	n	2	7.22								x	
Acton	53.2	HK	rolled	31	p	1	20	a	0	4.39									
Acton	57.5	DF	rolled	38	f	0	0	n	2	5.47									
Acton	57.4	FG	rolled	61	f	0	0	n	2	4.73									x
Belhus Park	ID2/01 .1	M	slightly rolled		f	0	5	m	2	2.01									
Belhus Park	ID2/01 .2	H	slightly rolled		f	1	5	m	2	3.02								x	
Sonning	AD114	J	very rolled	28	f	0	35	a	0	3.36									
Sonning	1925.2 4A	F	rolled	39	p	0	5	b	1	2.27	x								
Sonning	Z2926 6	J	rolled	39	f	0	0	n	2	3.01									
Sonning	AD99	DK	very rolled	29	p	0	5	b	2	4.01									
Sonning	AD440	GJ	very rolled	38	f	0	0	n	2	2.71							x		
Sonning	AD824	GK	rolled	51	f	0	5	m	0	3.09									
Sonning	AD636	G	very rolled	50	f	0	0	n	2										
Sonning	AD784	F	very fresh	58	p	0	10	b	2	2.78									
Sonning	AD234	FG	slightly rolled	40	p	0	15	a	0	4.71						x			
Southac re	62.264 .2	FG	slightly rolled	47	p	0	5	b	1	5.27		x							

Southacre	62.264.1	FM	rolled	54	p	0	15	b	2	2.94	x	x

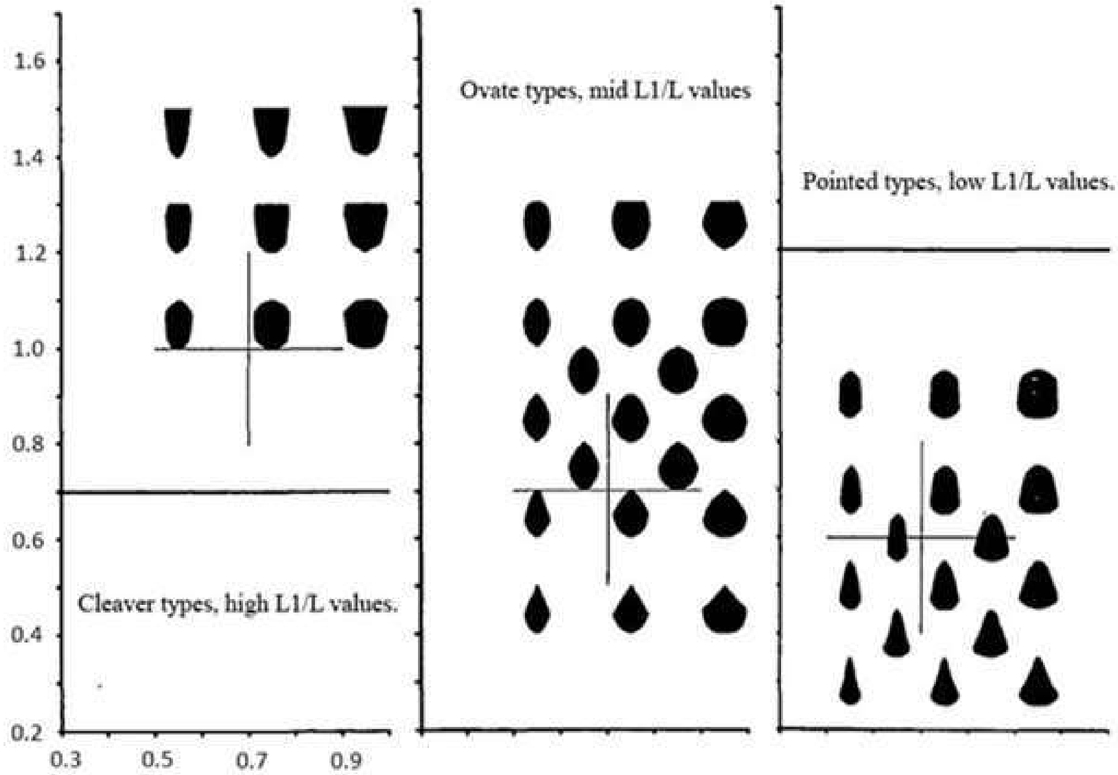
Appendix II – Tripartite diagrams.

II.i.

Colour coding for condition, used on the tripartite diagrams below where applicable**.** The categorisation used by the present study is shown on the left; the three-category system used by Lee (2001) is shown on the right.

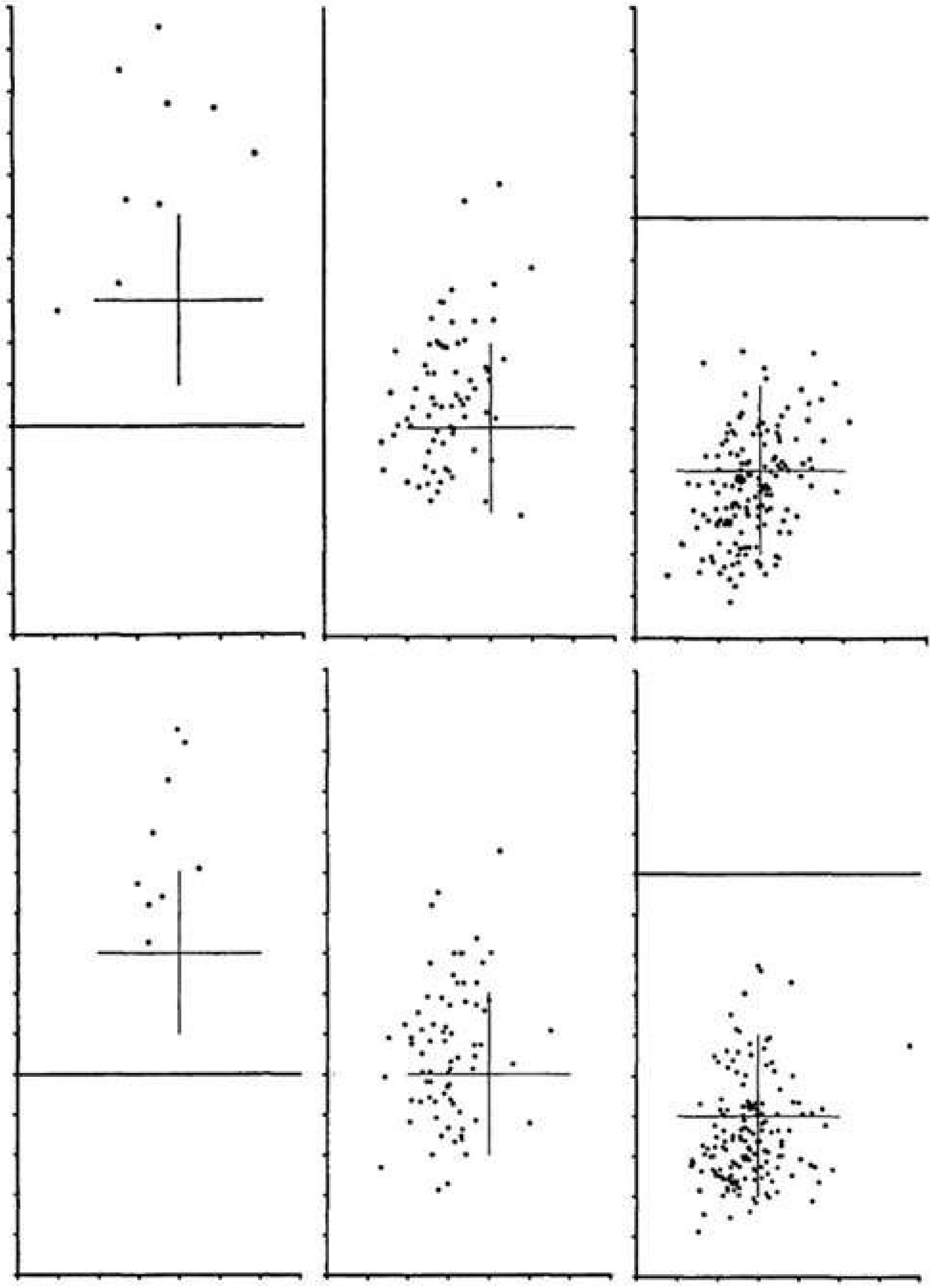
II.ii

Tripartite diagram interpretative key (after Roe 1968a, p.31, fig. 4).

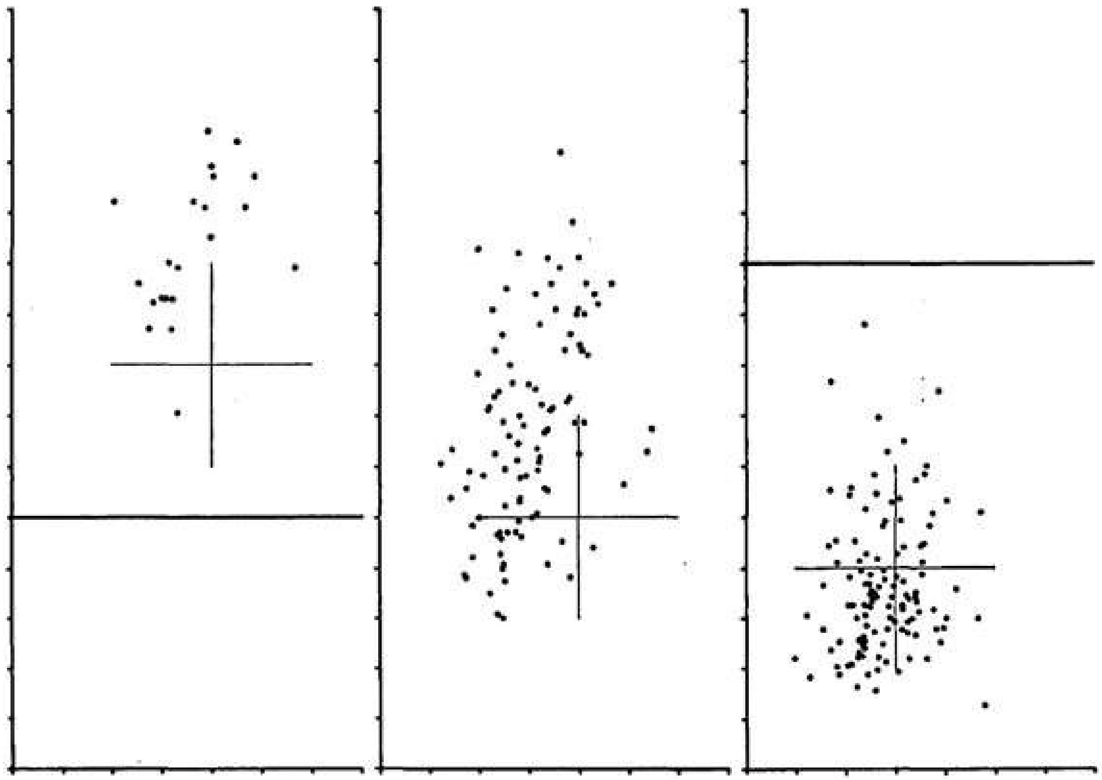


II.iii. Tripartite diagrams.

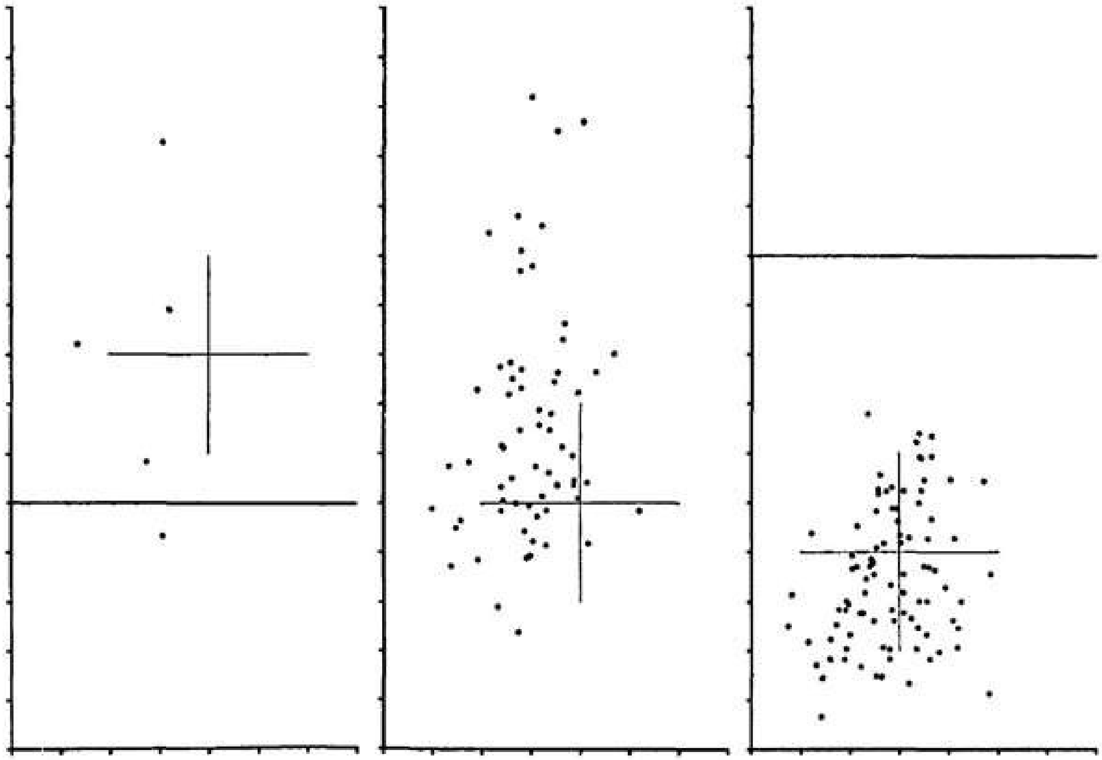
Furze Platt (Roe 1968a, p.33, Fig. 5 & 6). n=469 total, C=3.8%; O=31.4%; P=64.8%.



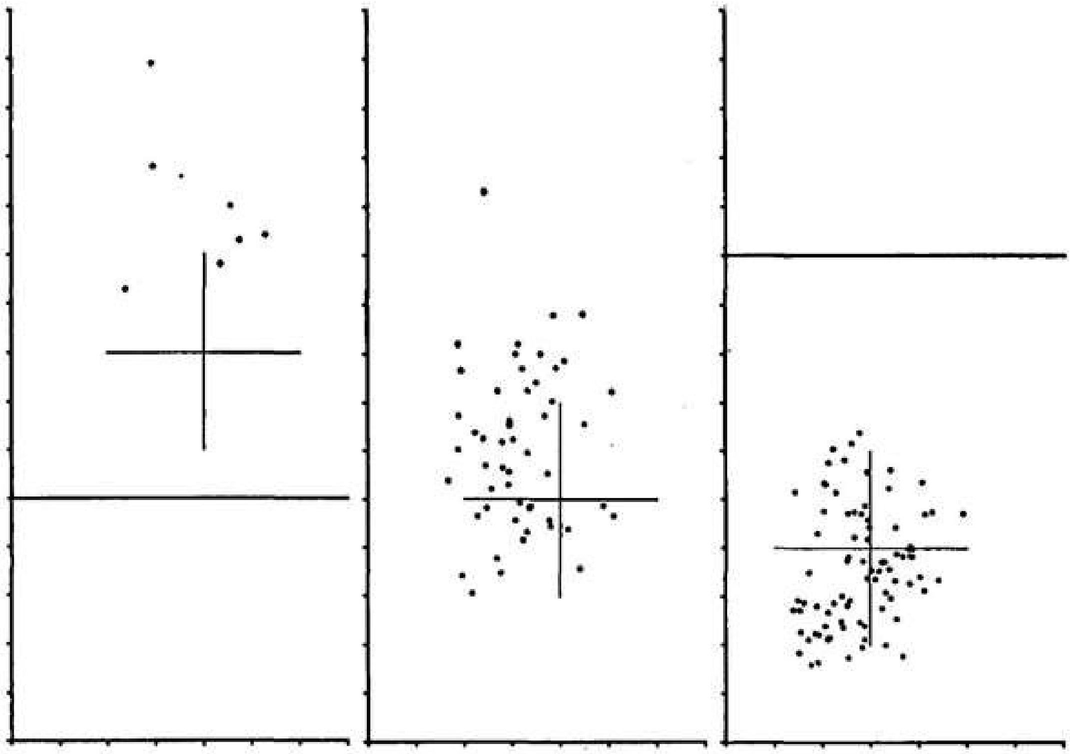
Baker's Farm (Roe 1968a, p.34, fig. 7). n=236, C=8.9%; O=42.0%; P=49.1%.



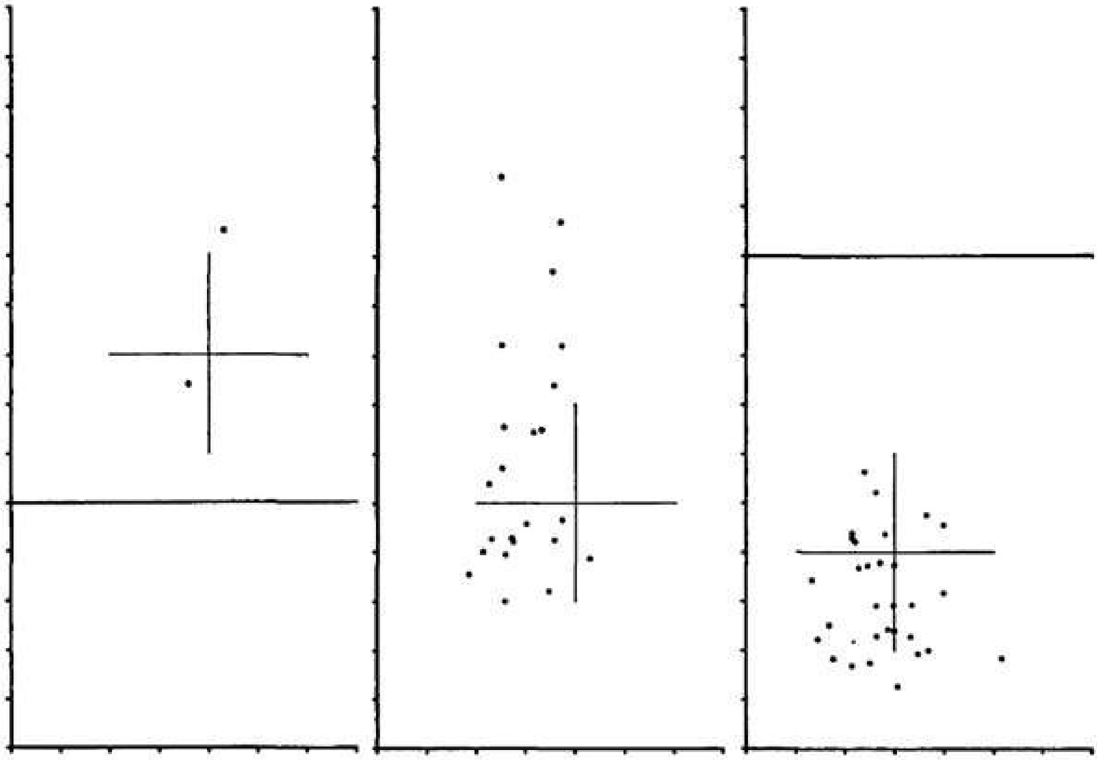
Cuxton (Roe 1968a, p.34, fig.8). n=160, C=3.1%; O=40.0; P=56.9%.



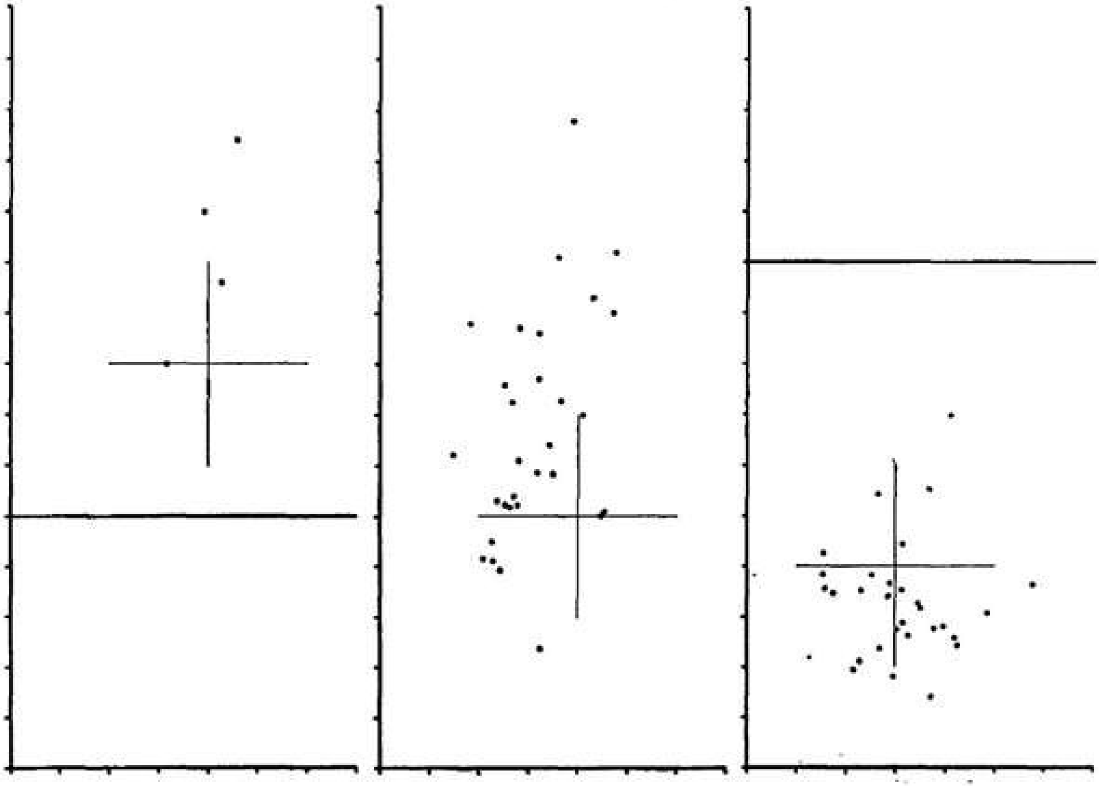
Whitlingham (Roe 1968a, p.35, fig.9). n=142, C=4.9%; O=36.6%; 58.5%.



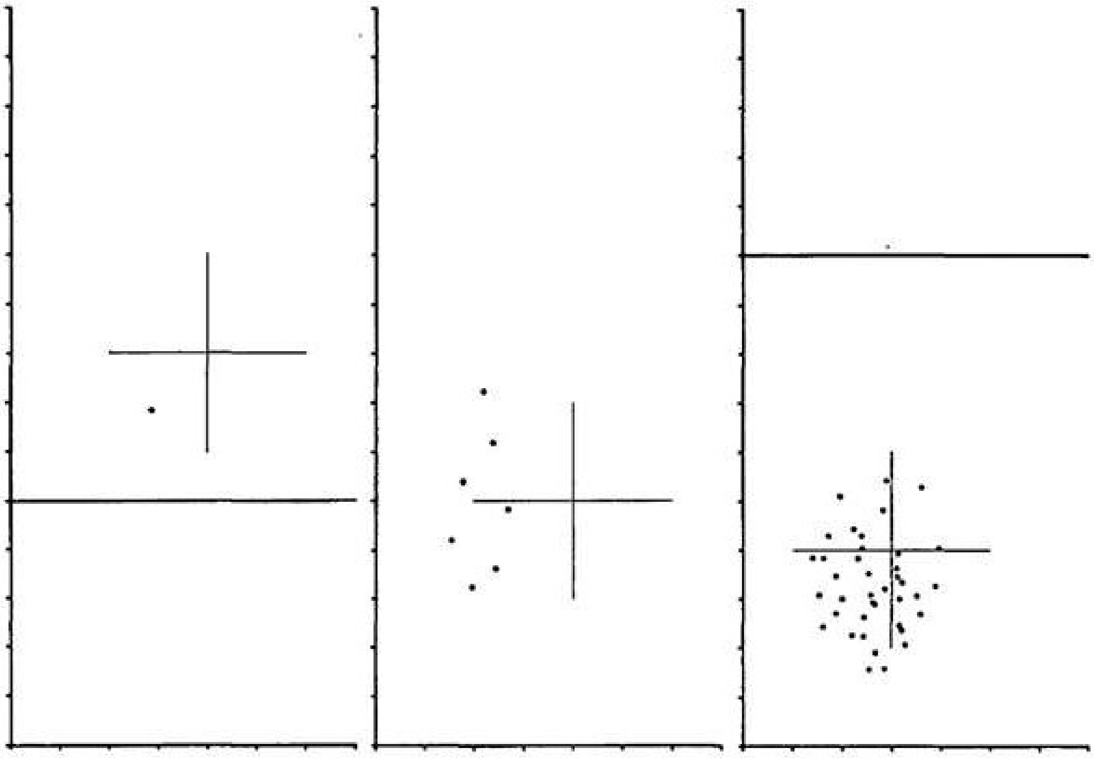
Twydall (Roe 1968a, p.35, fig.10). n=55, C=3.6%; O=41.8%; P=54.6%



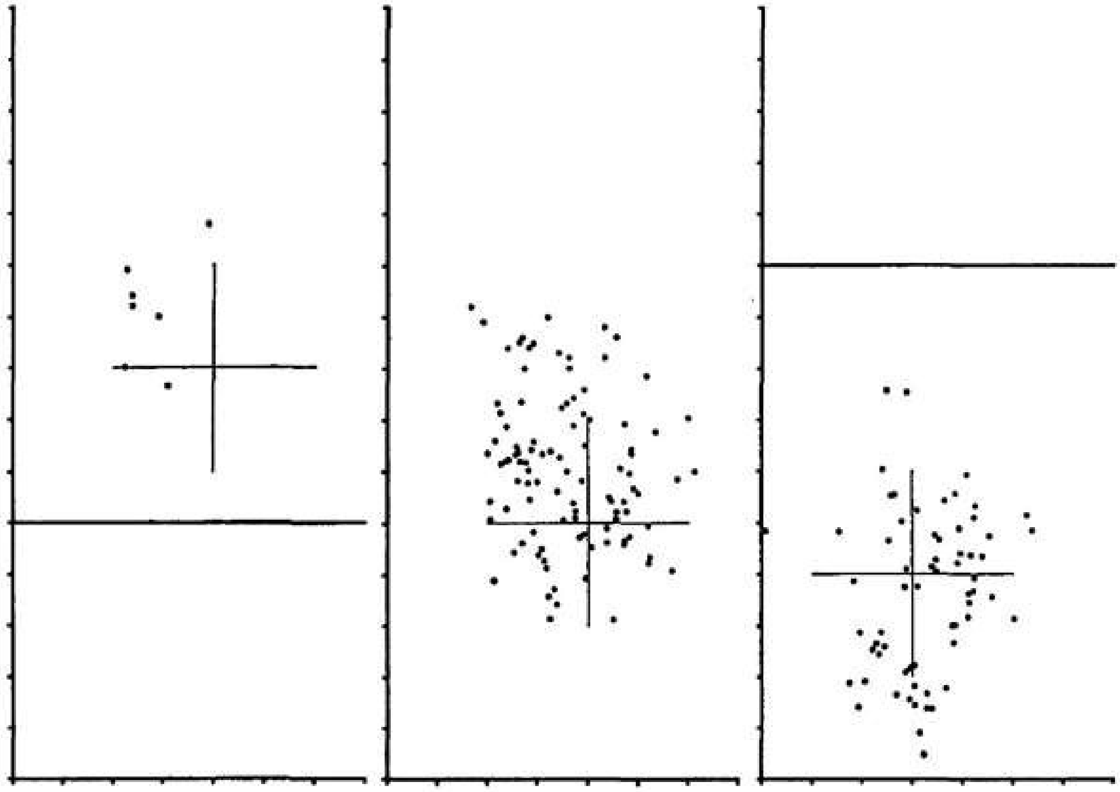
Stoke Newington (Roe 1968a, p.36, fig.11). n=63, C=6.3%; O=47.7%; P=46.0%.



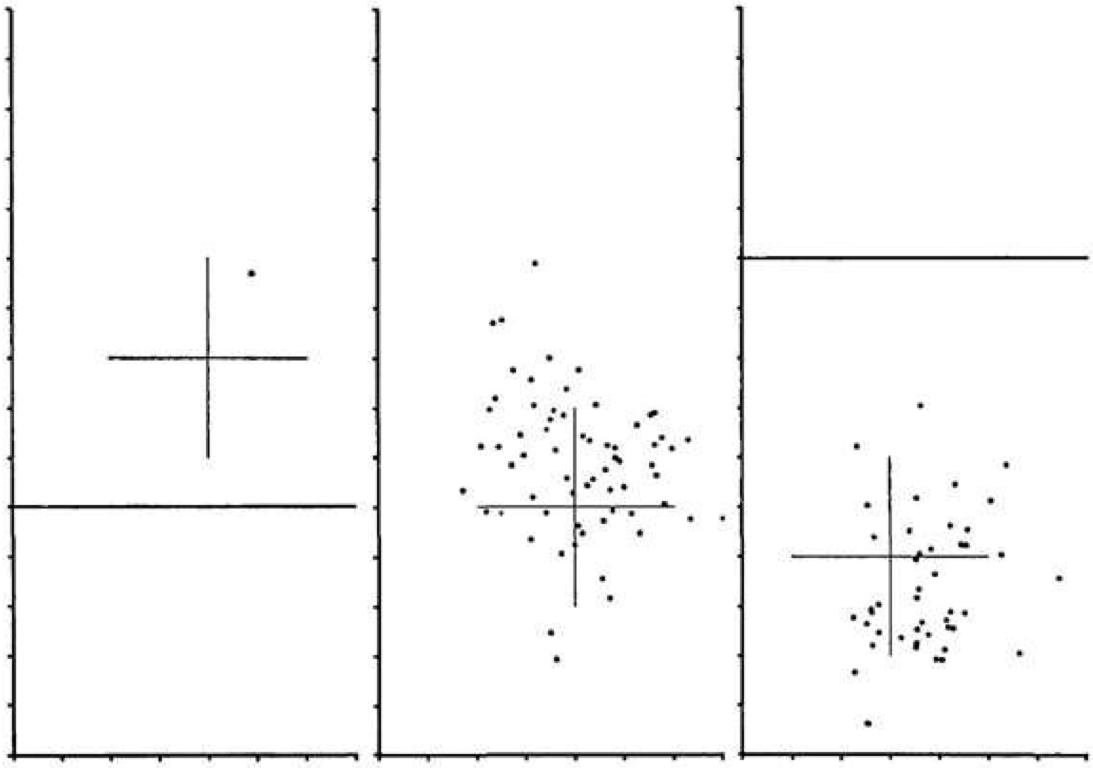
Wolvercote (Roe 1968a, p.39, fig. 18). n=47, C=2.1%; O=14.9%; P=83.0%.



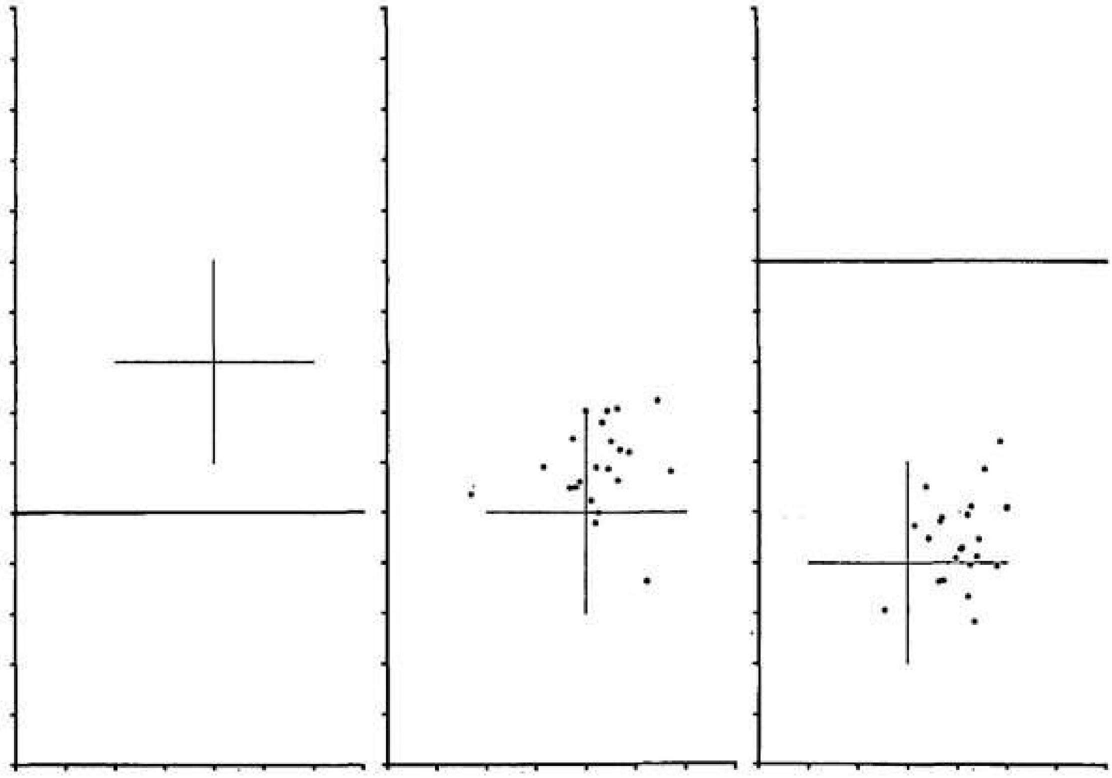
Broom (Roe 1968a, p.40, fig. 19). n=171, C=4.1%; O=58.5%; P=37.4%.



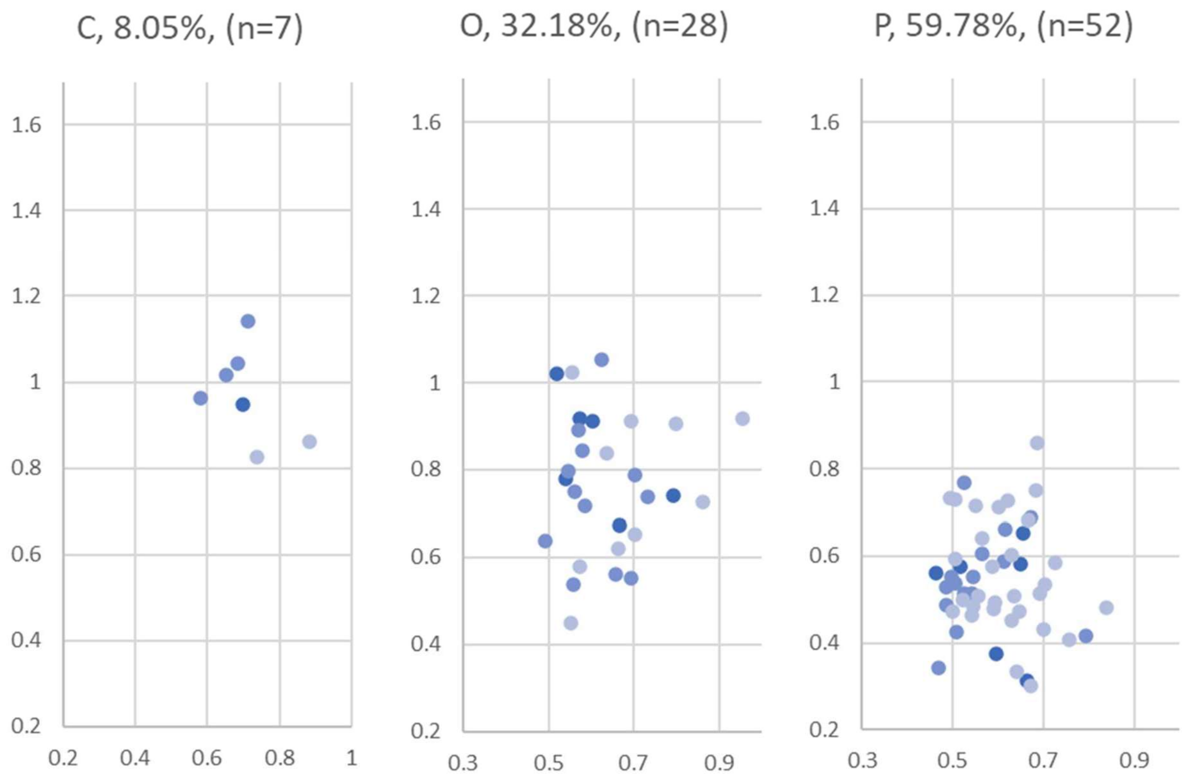
Barton Cliff (Roe 1968a, p.41, fig. 21). n=109, C=0.9%; O=57.8%; P=41.3%.



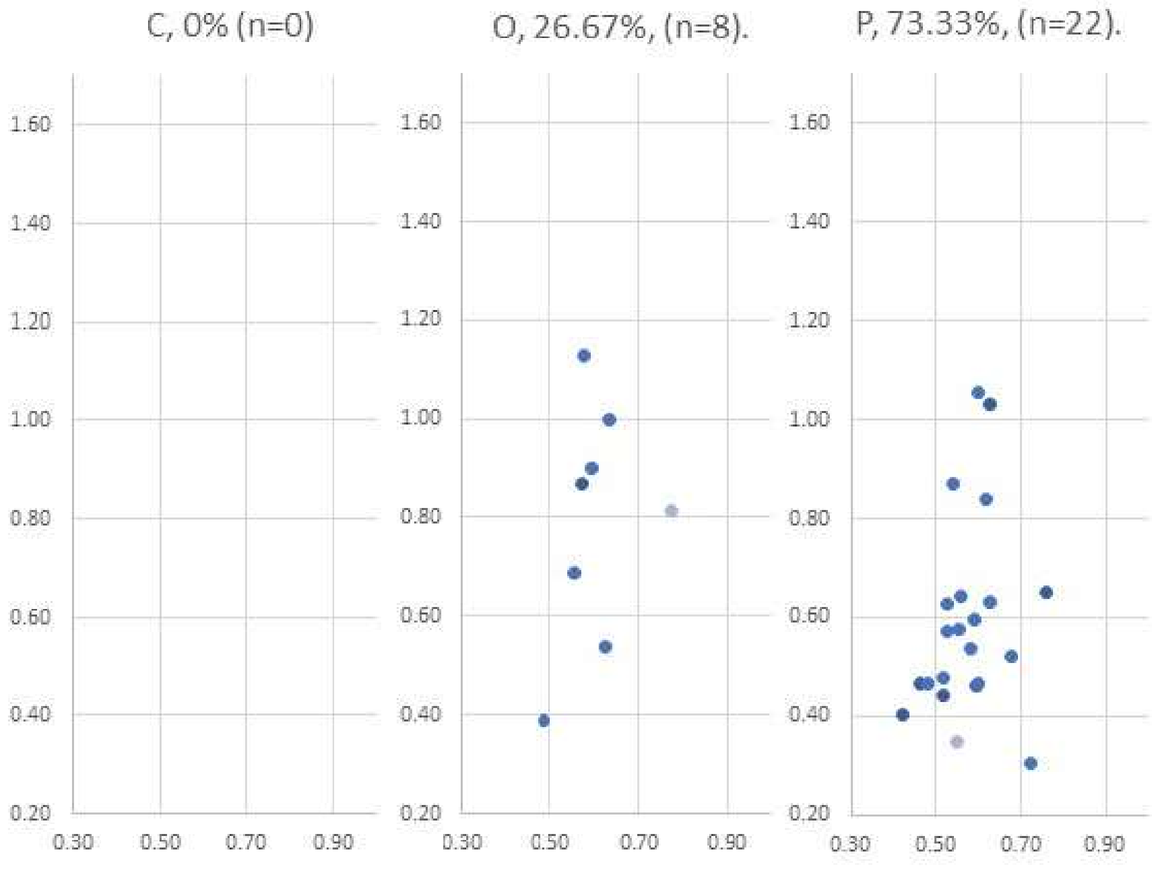
Great Pan Farm Pit (Shide) (Roe 1968a, p.47, fig.33). n=44, C=0%; O=50.0%; P=50.0%.



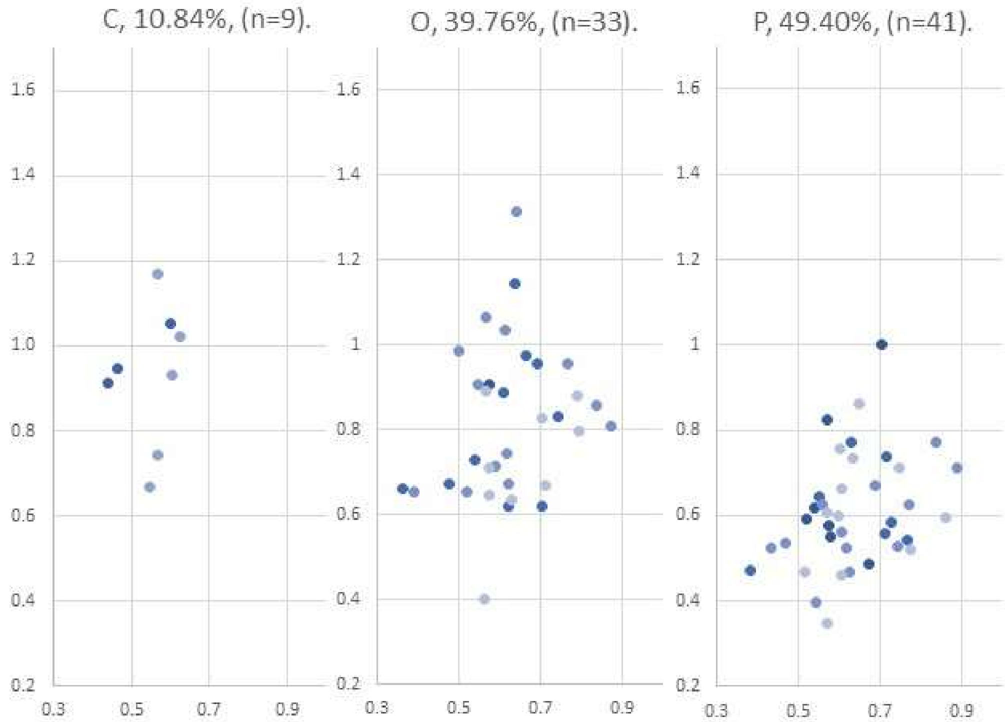
Aylesford (this study).



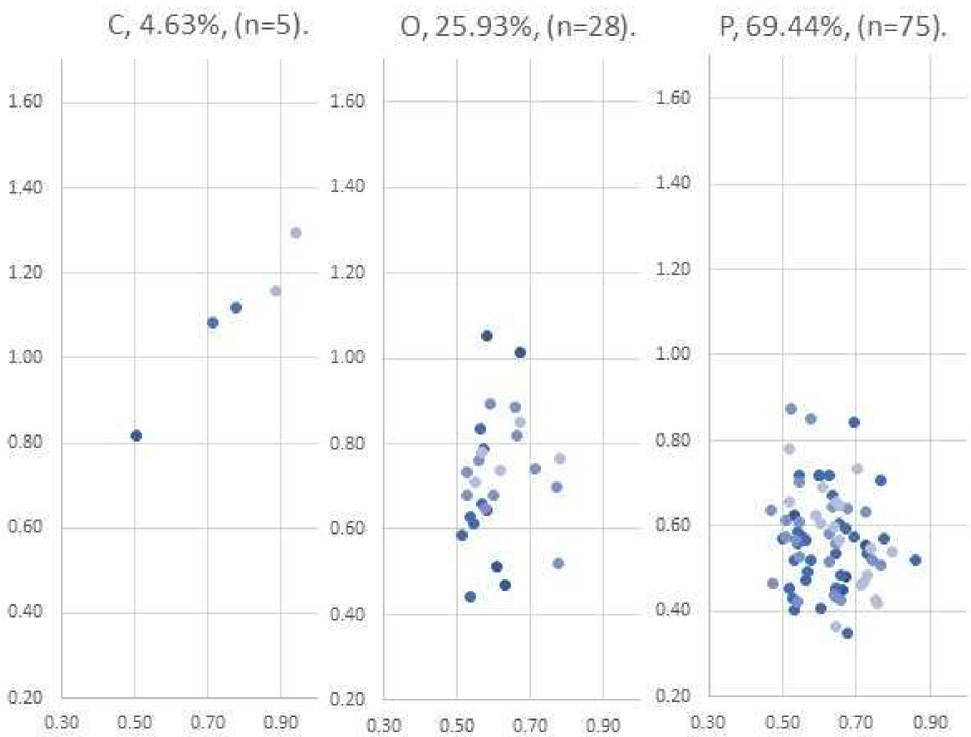
Baker's Farm (this study).



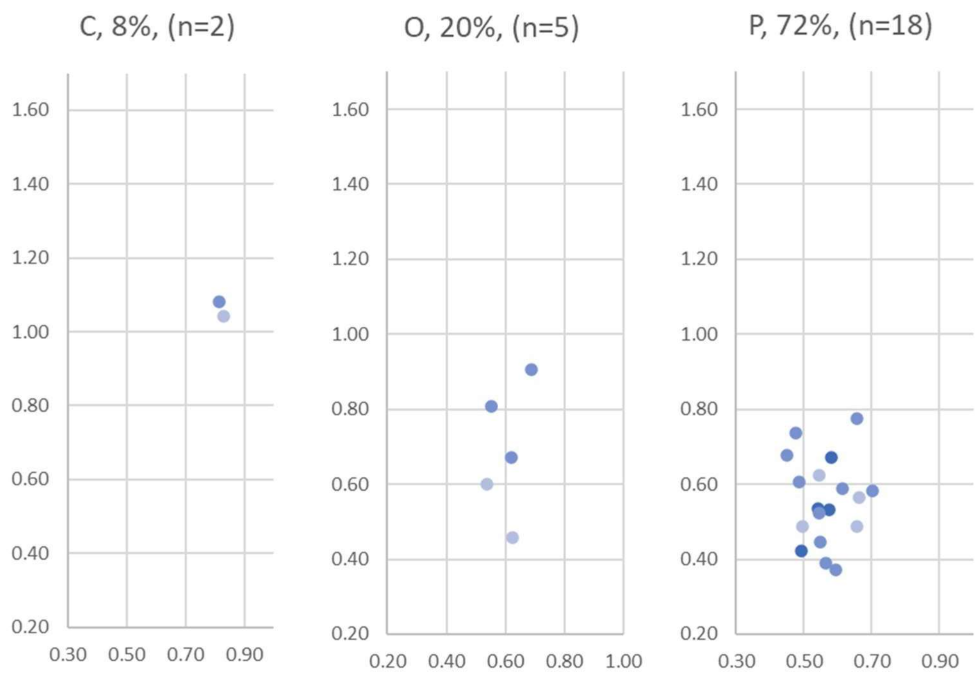
Barnham Heath (this study).



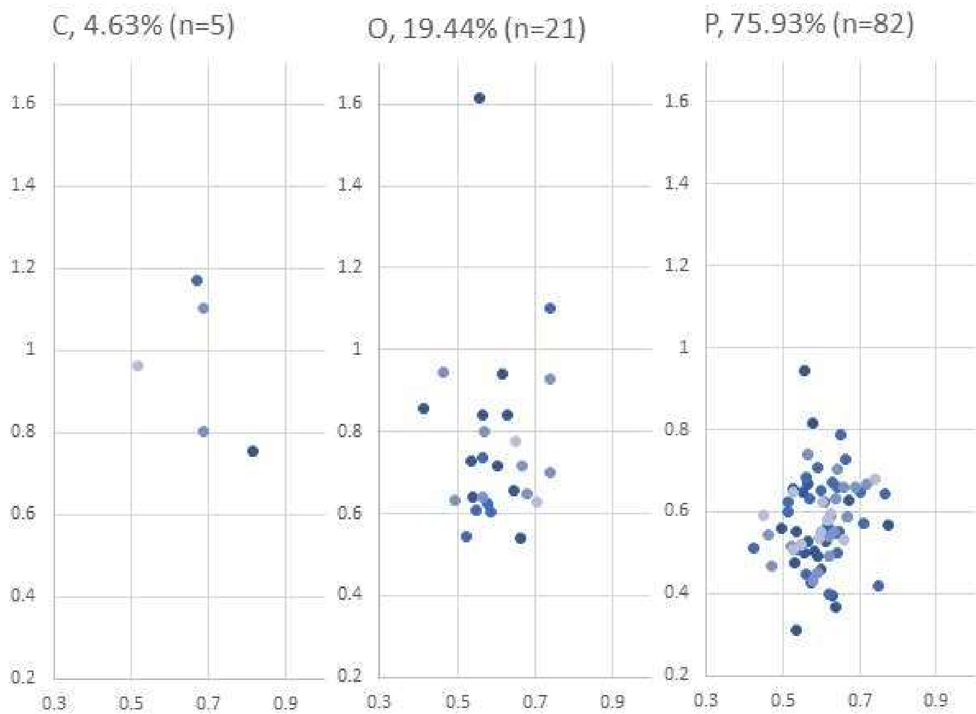
Biddenham (this study).



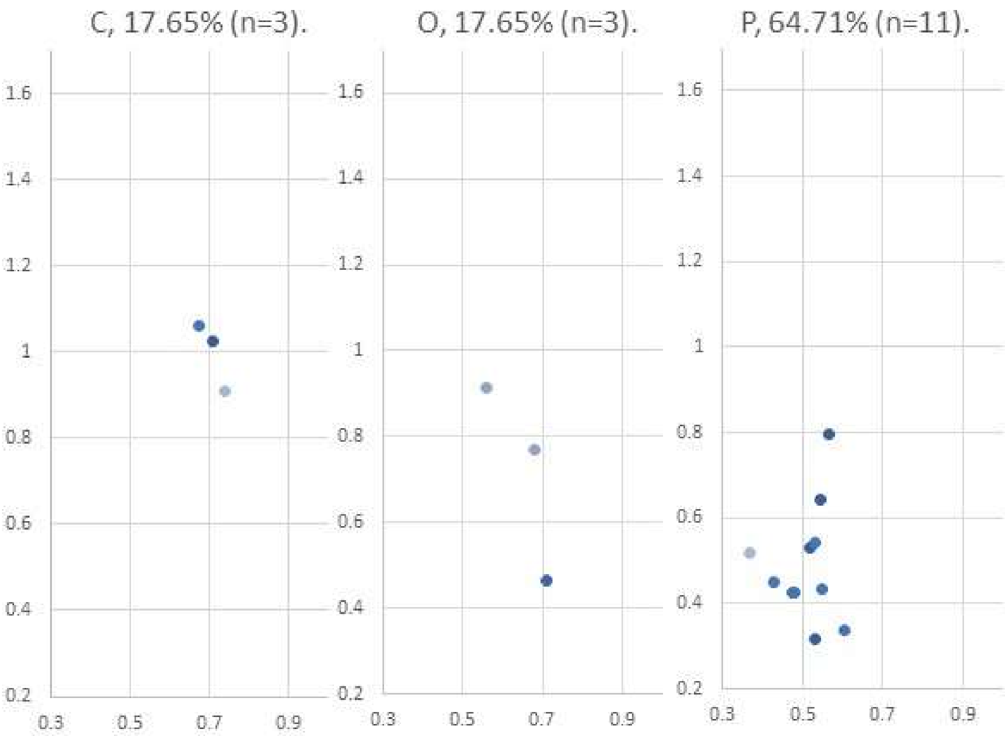
Bromham (this study).



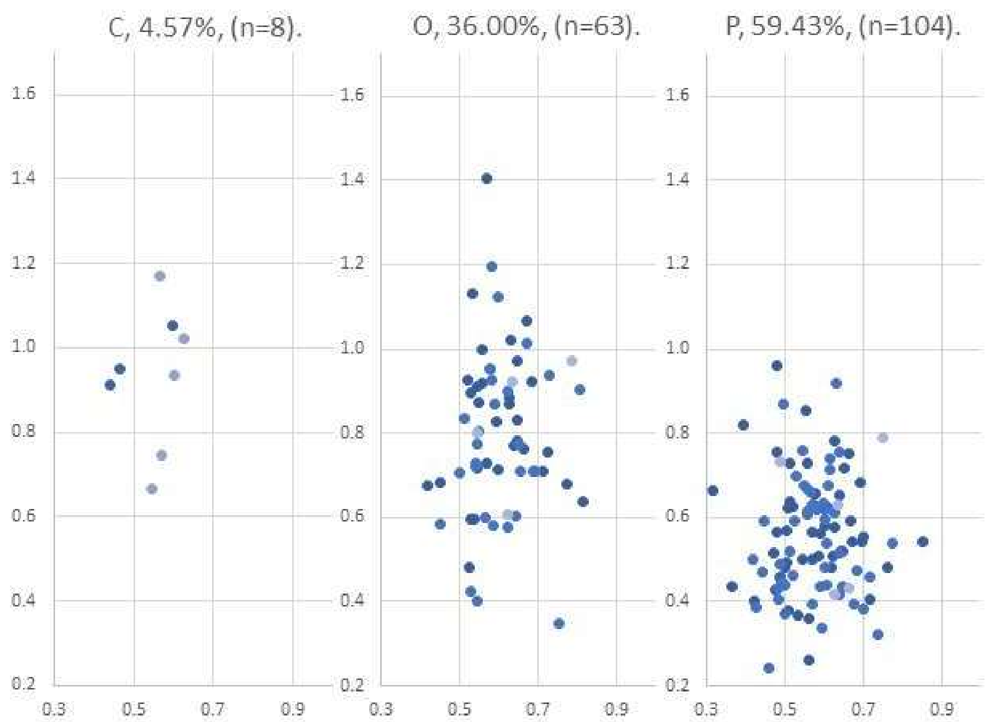
Cookham (this study).



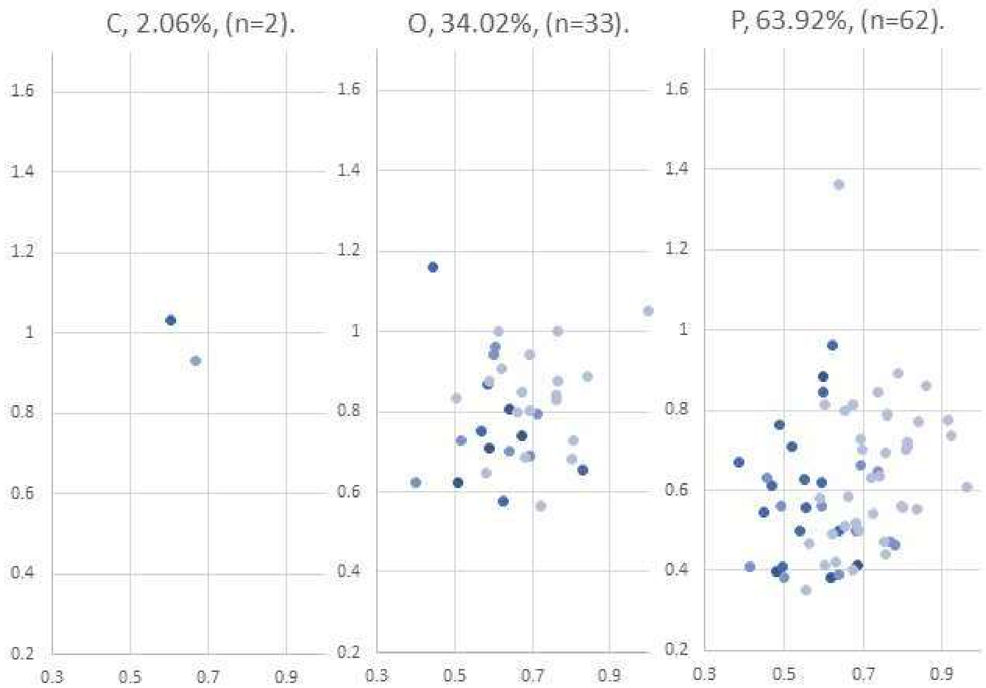
Canterbury West (this study).



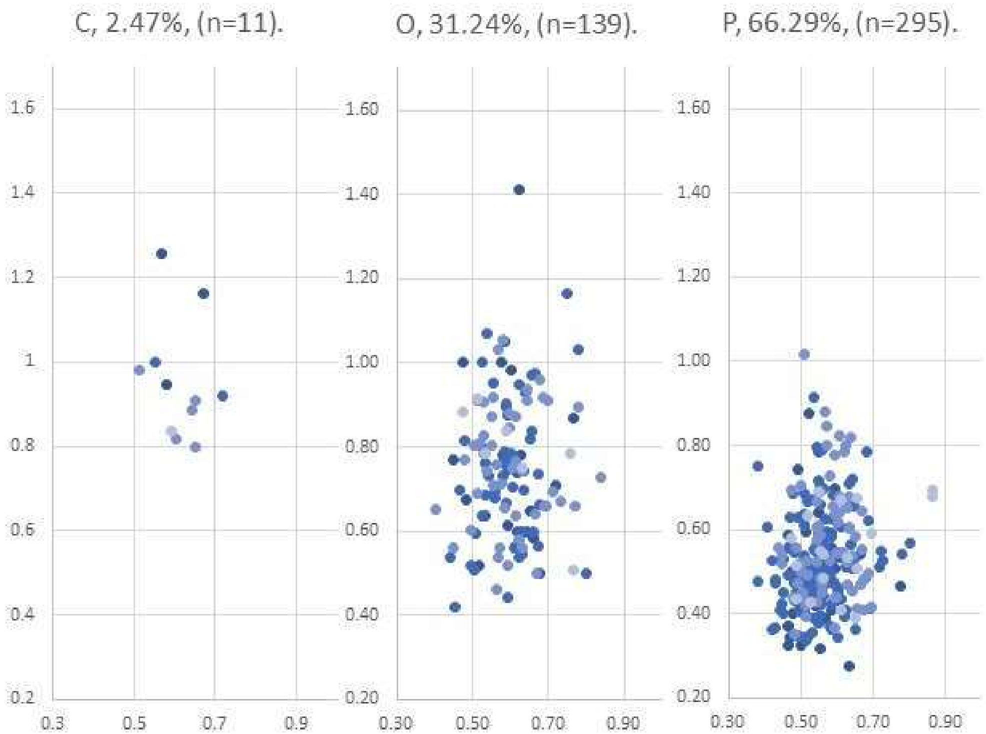
Cuxton (this study).



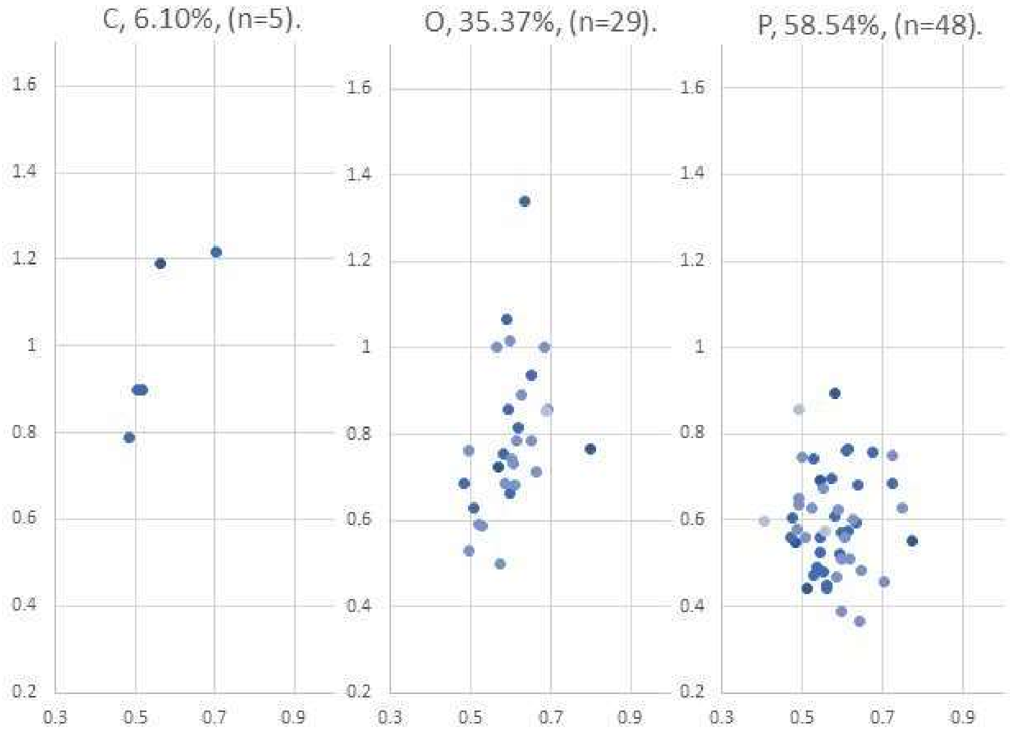
Dunbridge (this study).



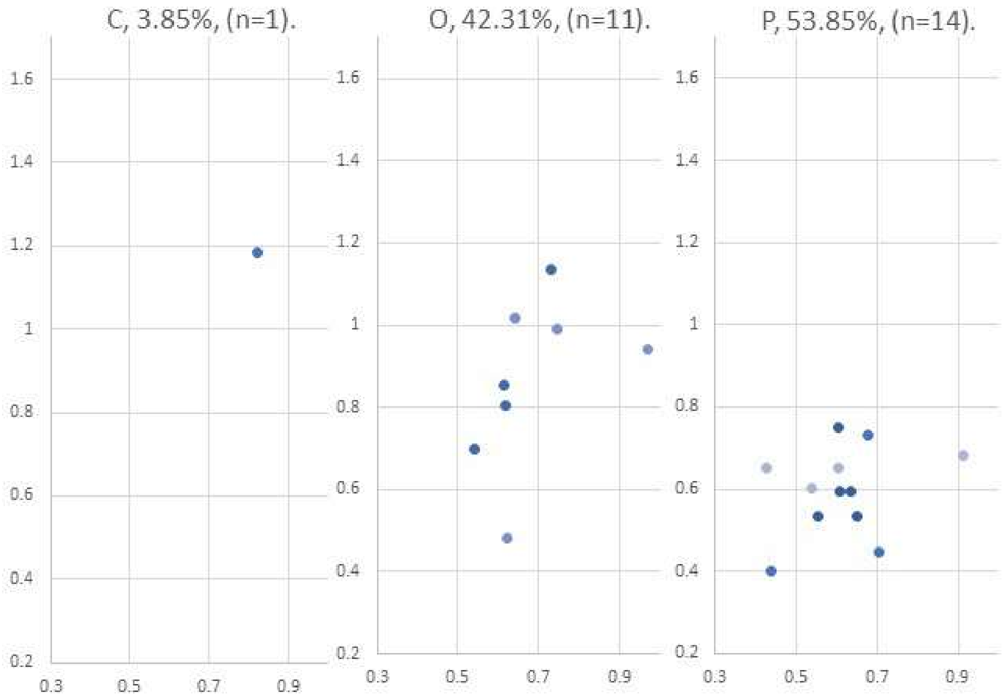
Furze Platt (probable Cannoncourt Farm Pit, this study).



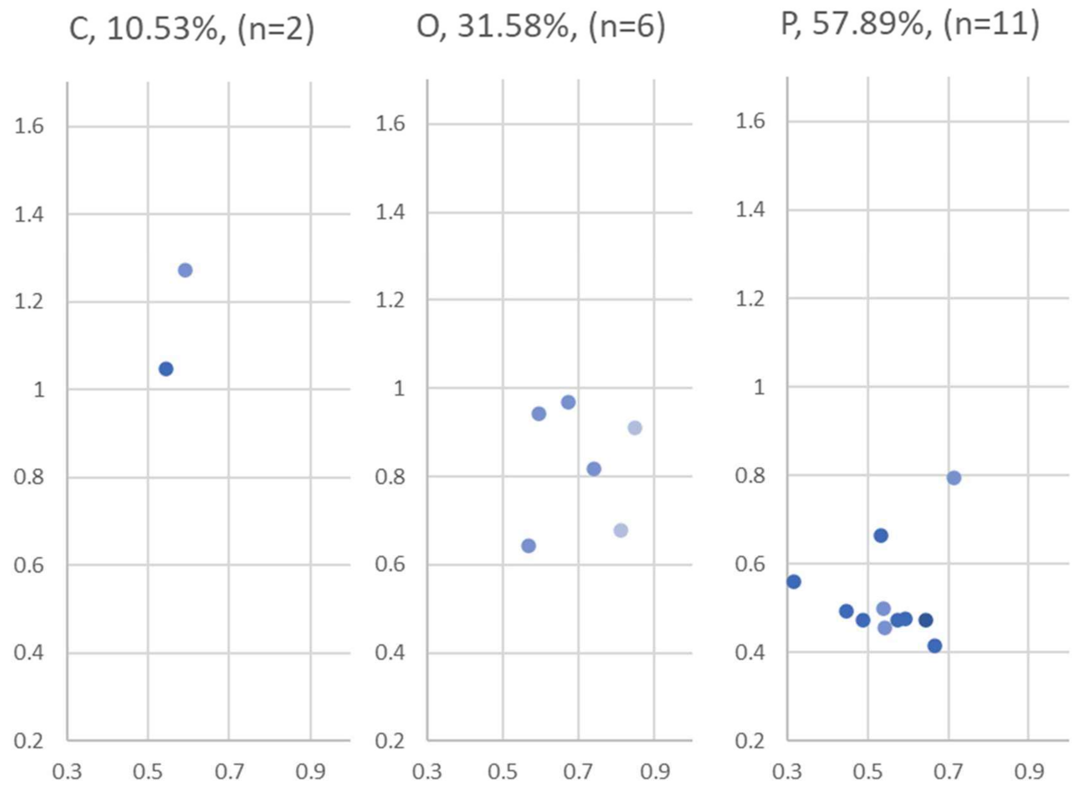
Furze Platt (probable Cooper's Pit) (this study).



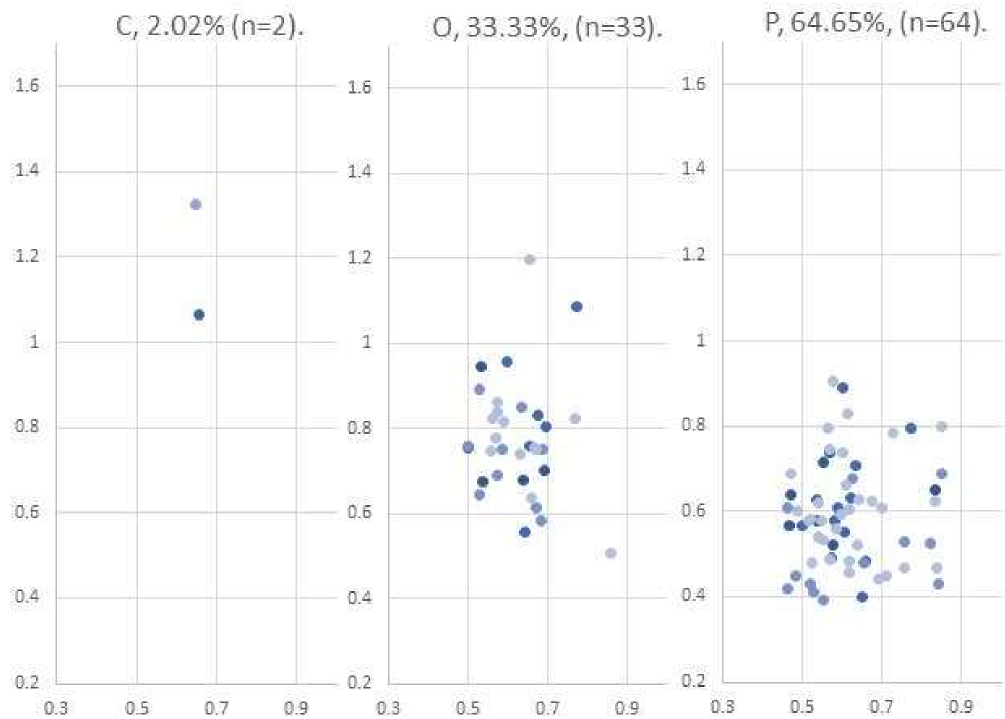
Farnham C (this study).



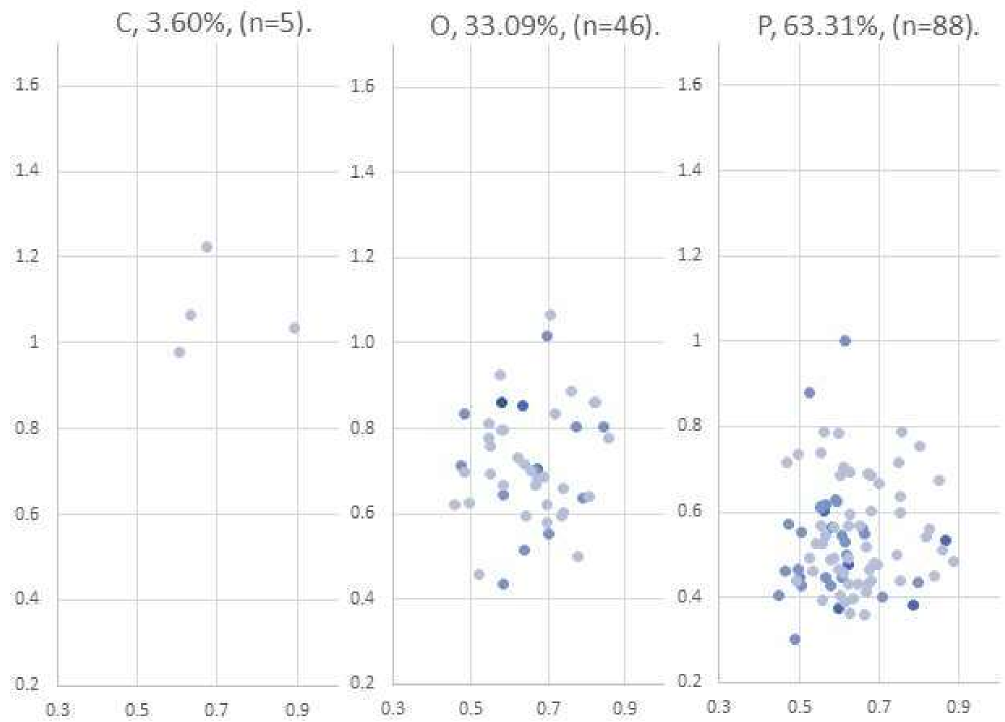
Ham Hill (Snodland) (this study).



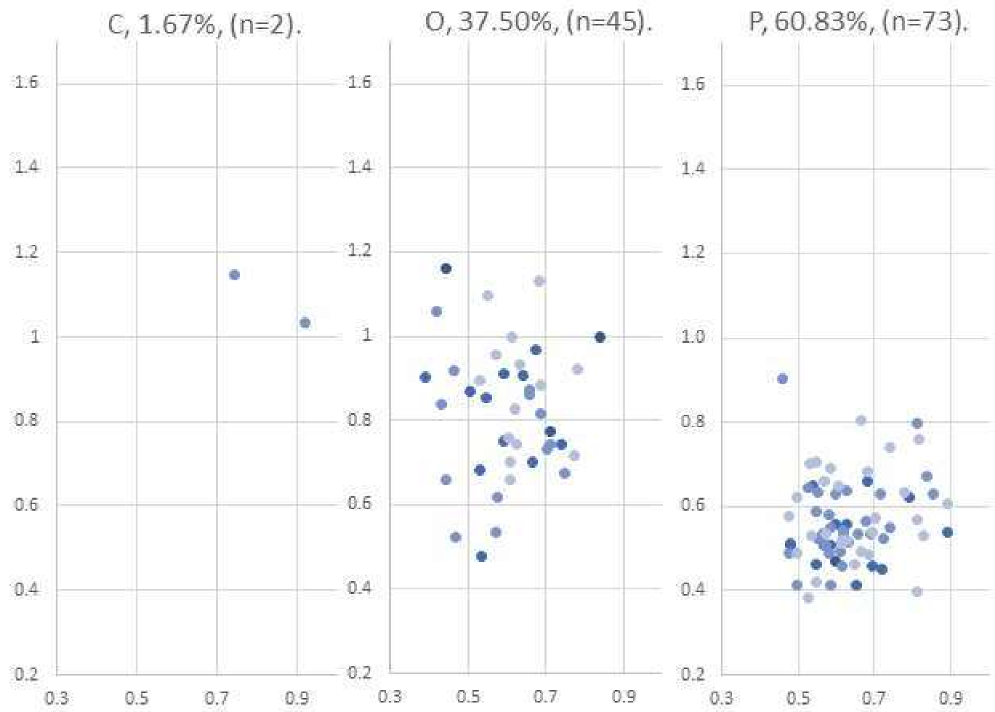
Hillingdon L.B. (this study).



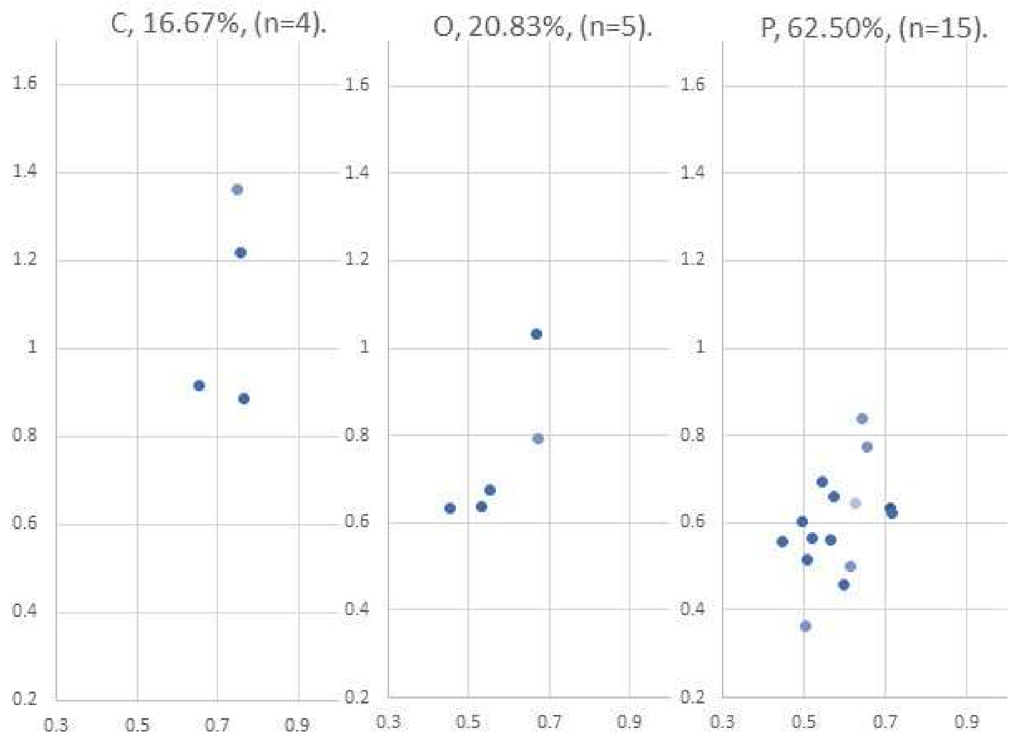
Iver (this study).



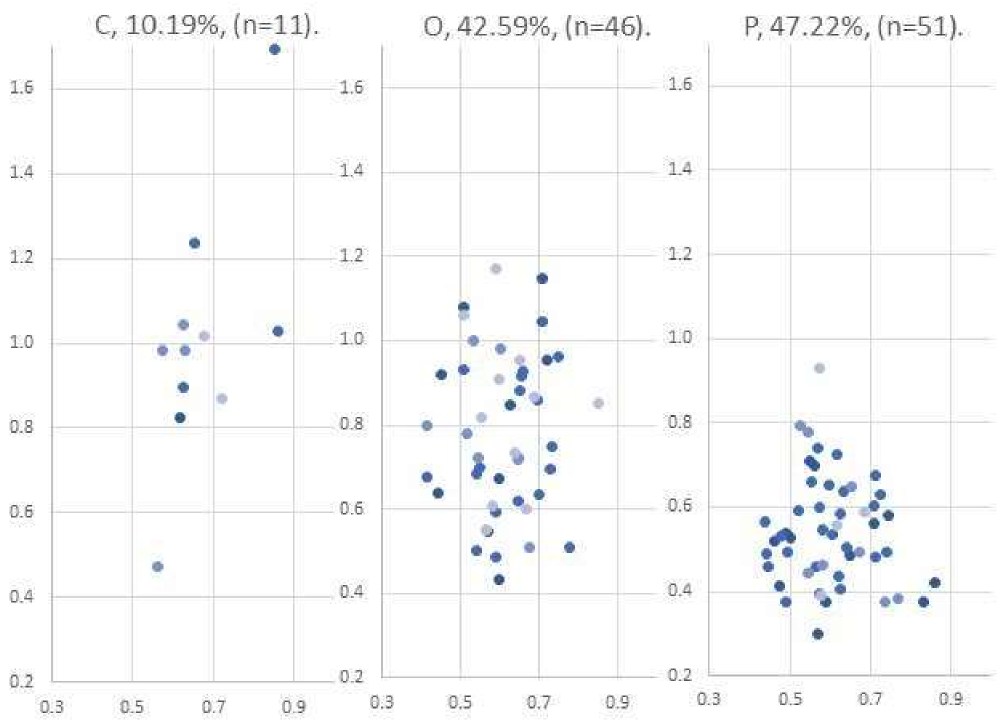
Kempston (this study).



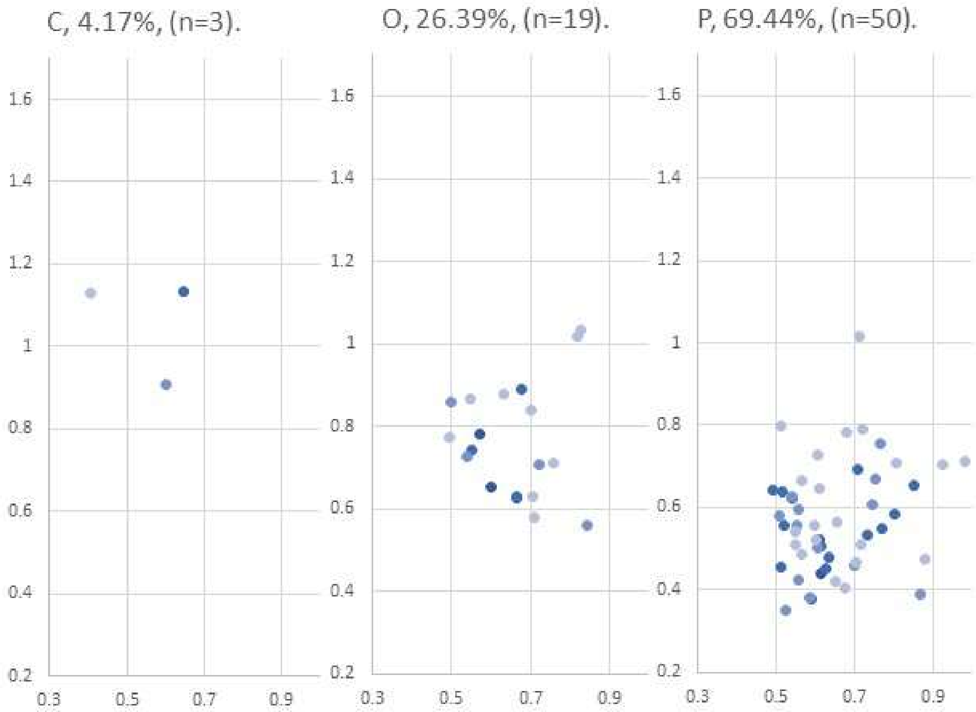
Keswick (this study).



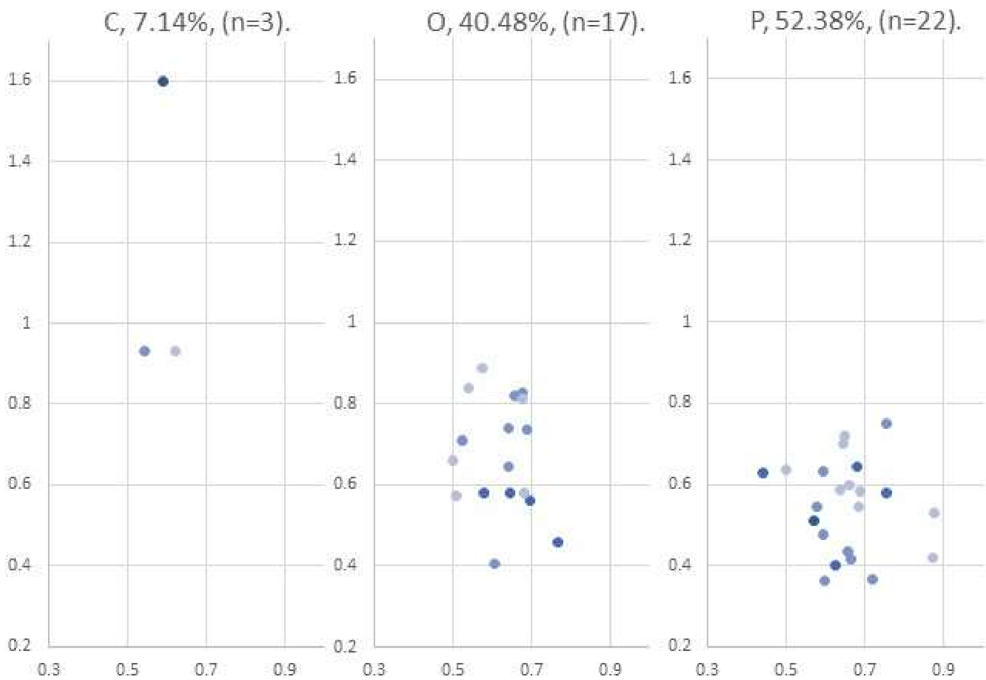
Lent Rise (this study).



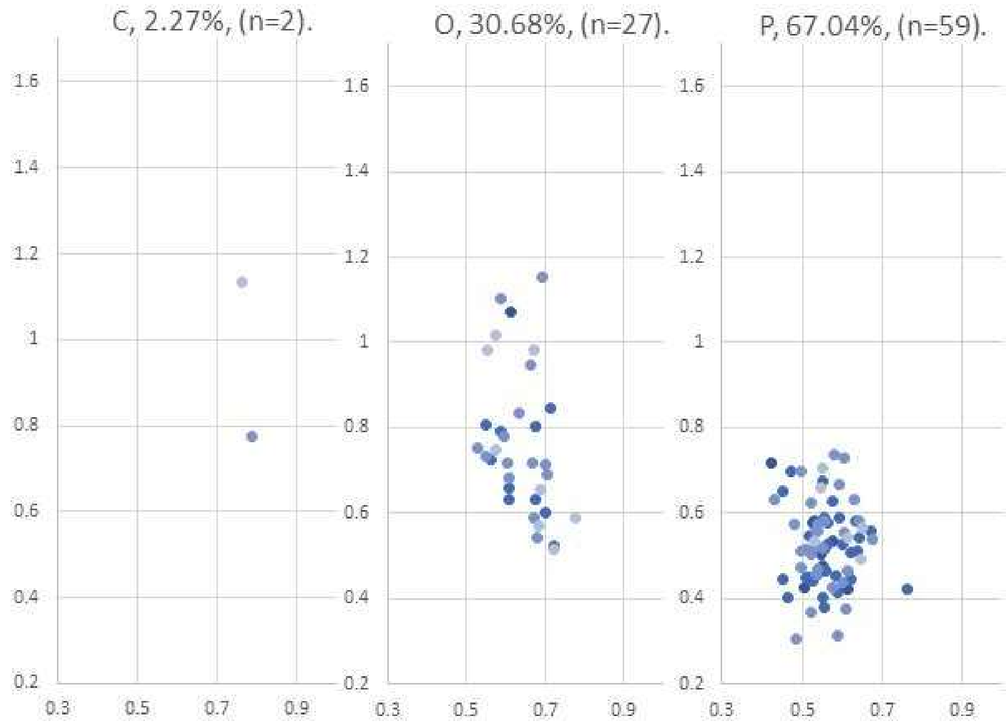
Leyton and Leytonstone (this study).



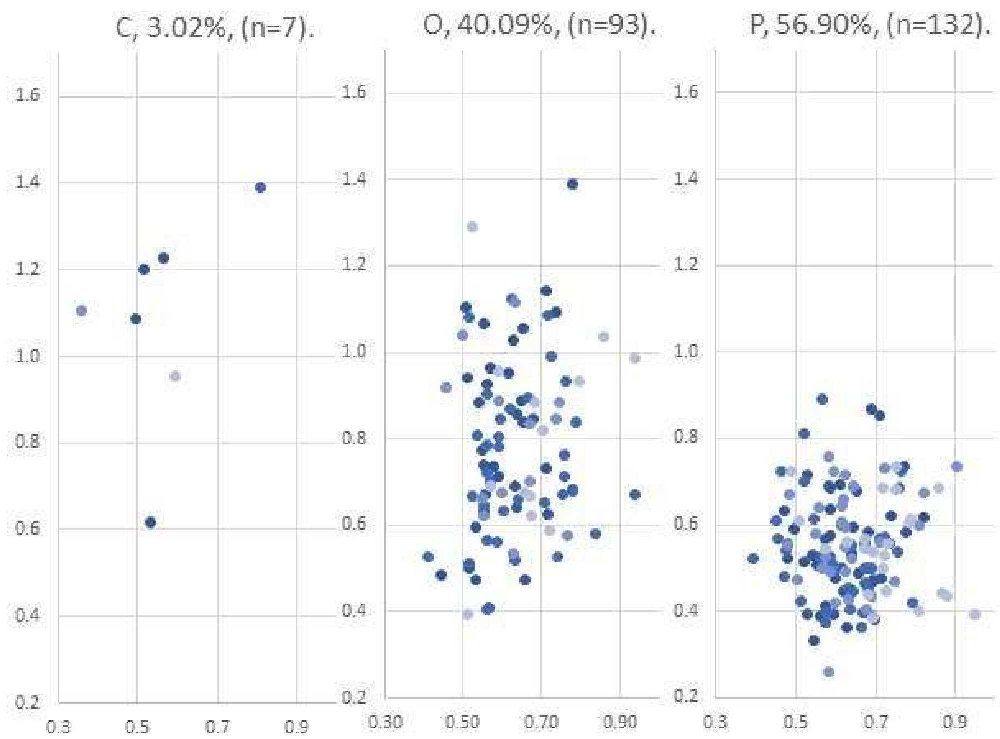
Lower Clapton (this study).



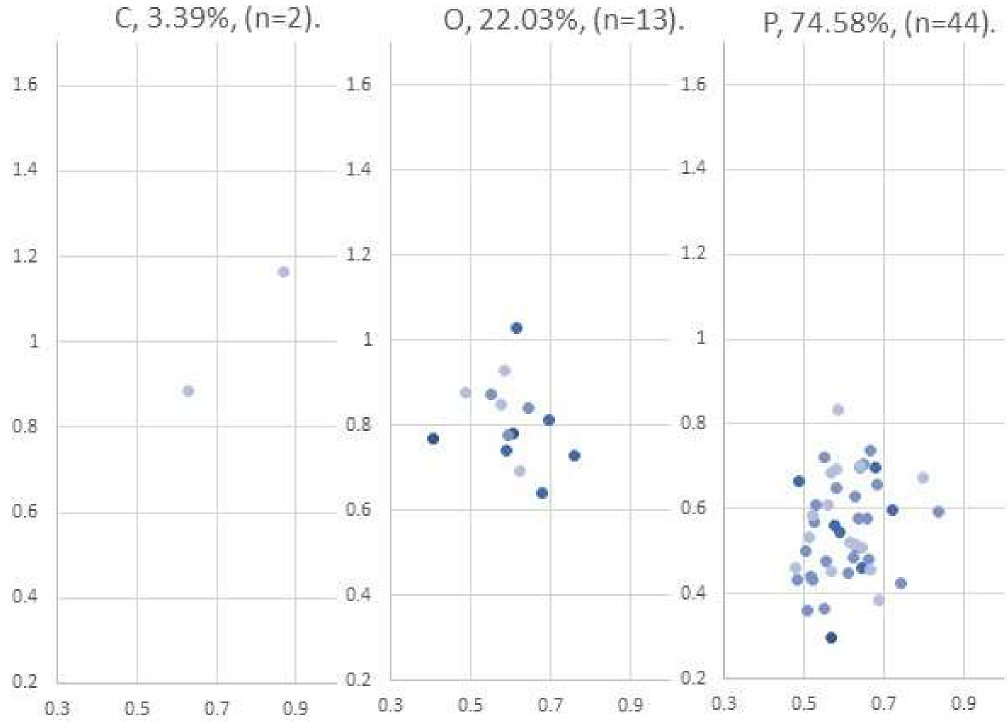
Ruscombe (this study).



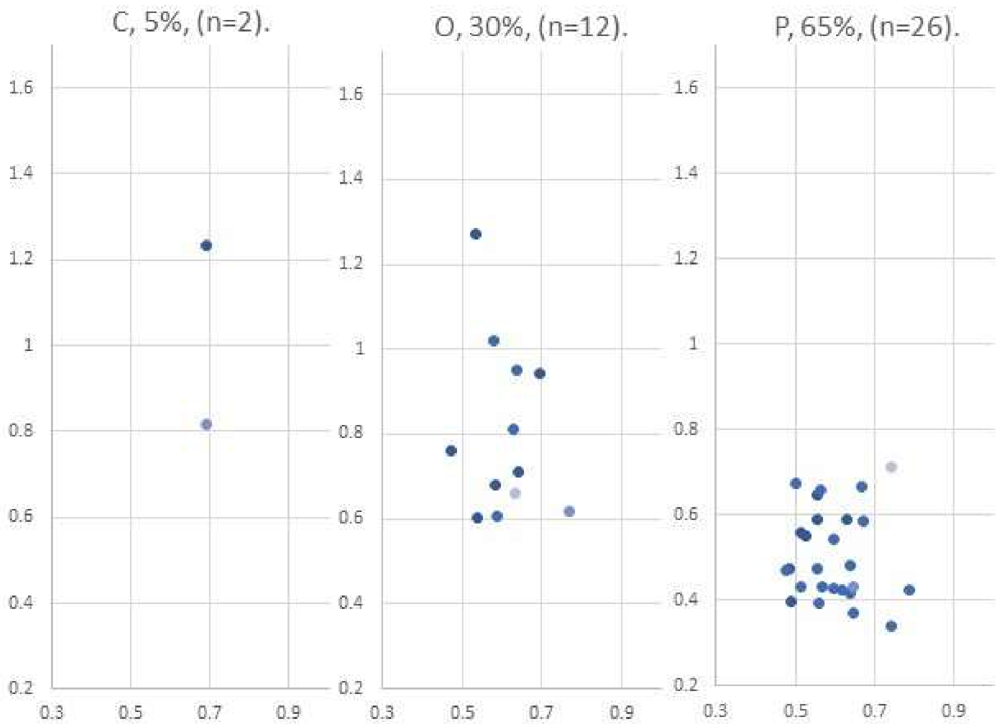
Stoke Newington (this study).



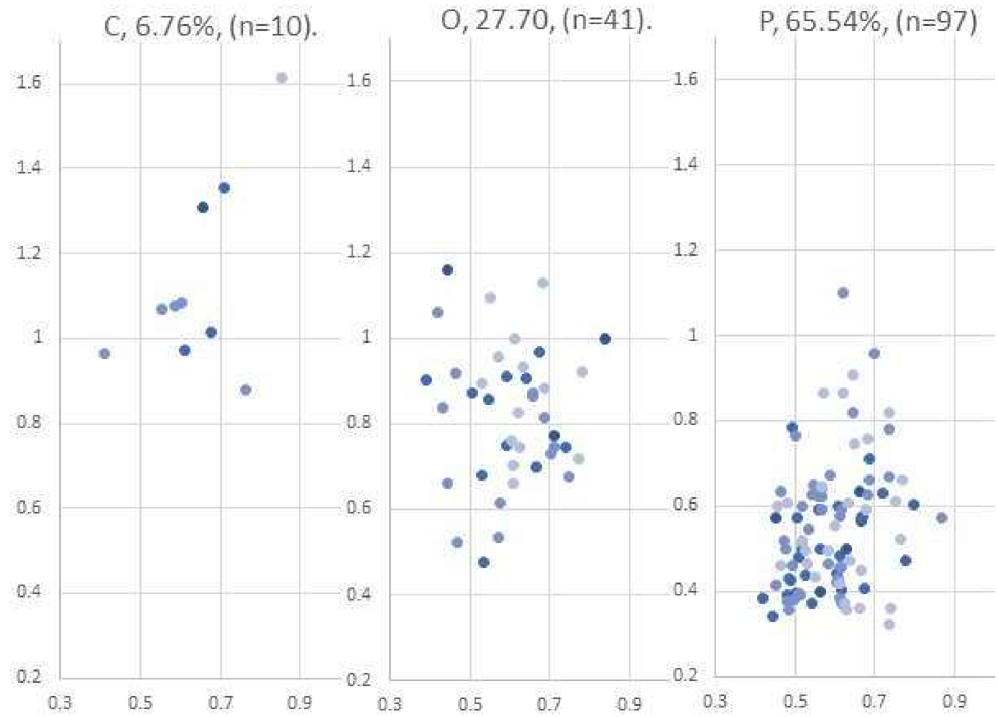
Thetford (this study).



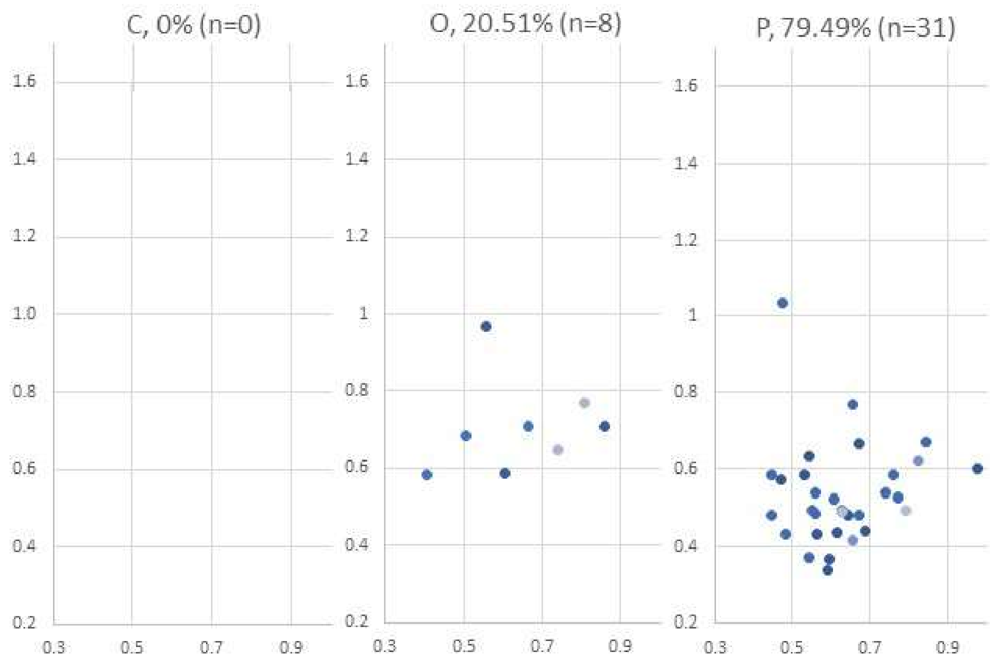
Twydall (this study).



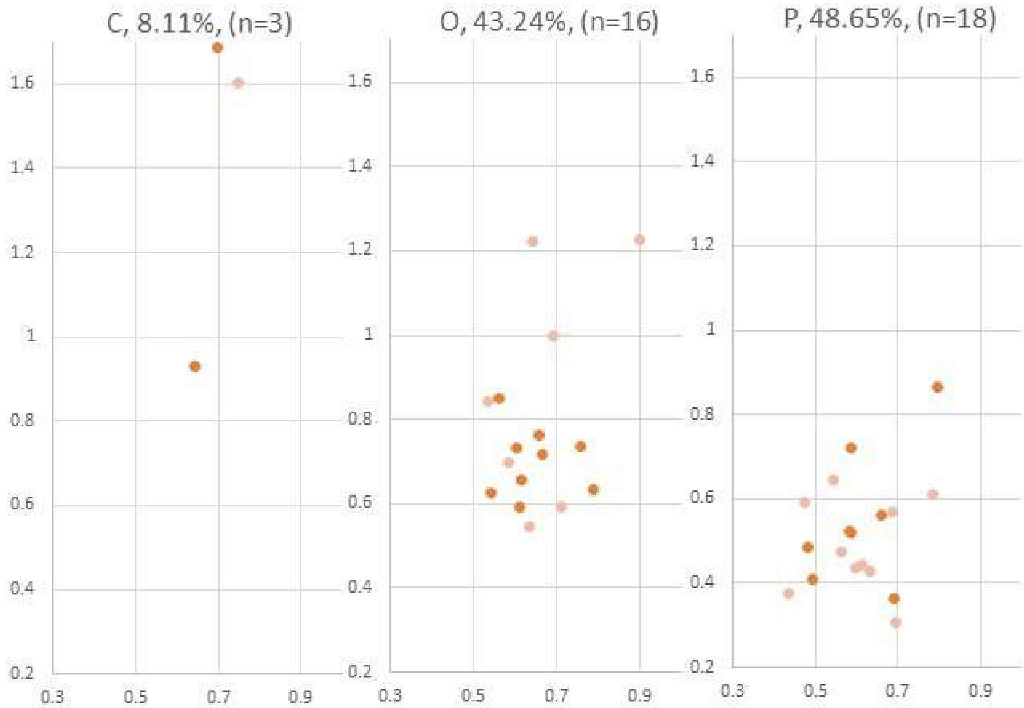
Warsash (this study).



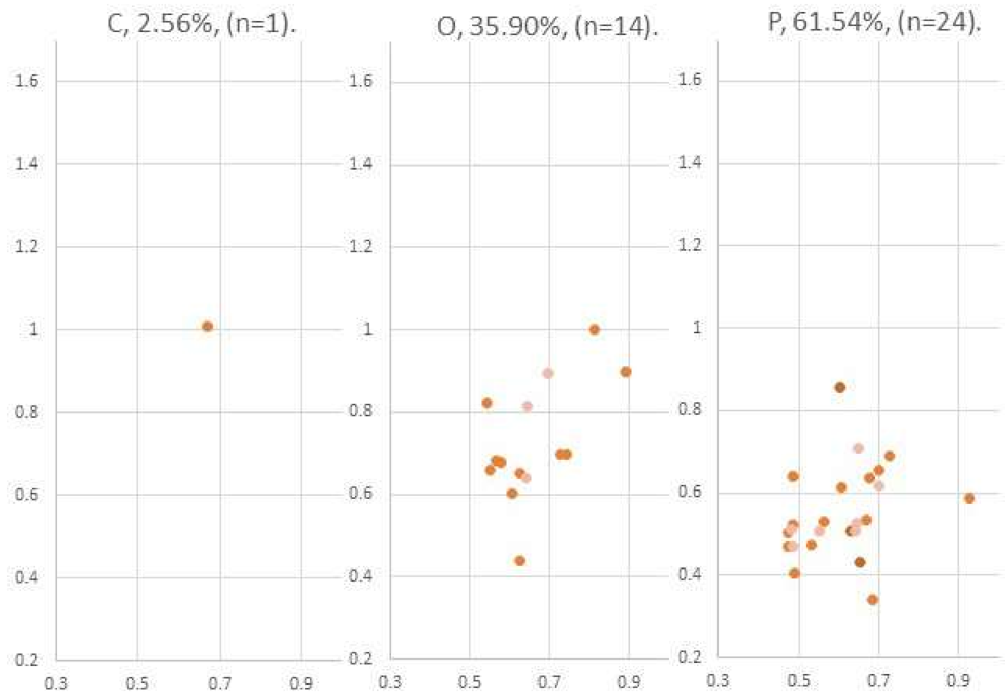
Wolvercote (this study).



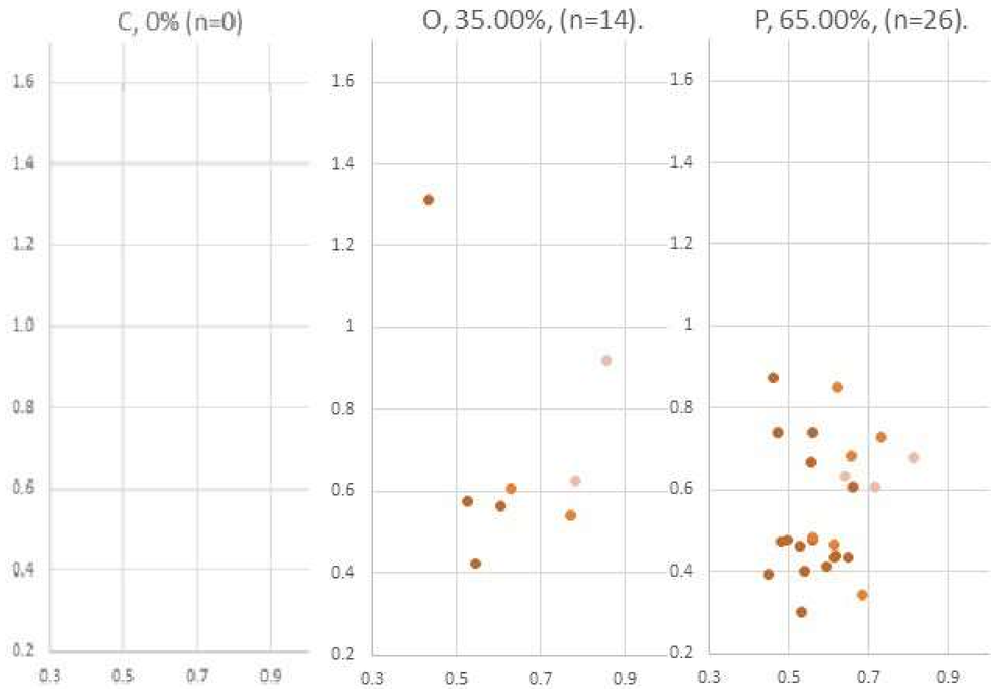
Berinsfield (Lee 2001)



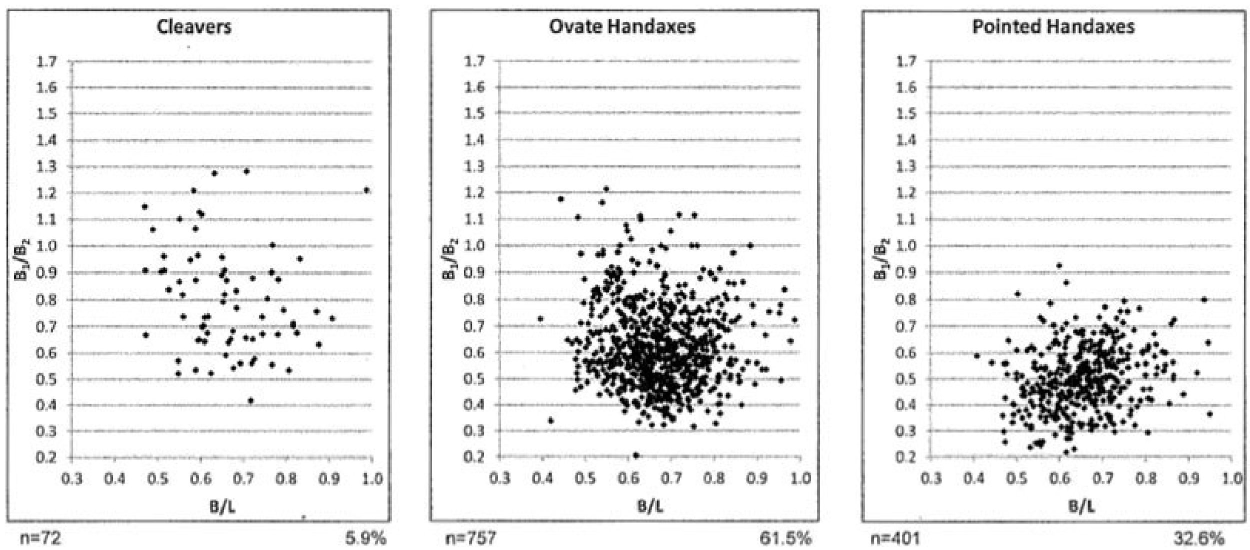
Stanton Harcourt (Gravelly Guy Pit) (Lee 2001).



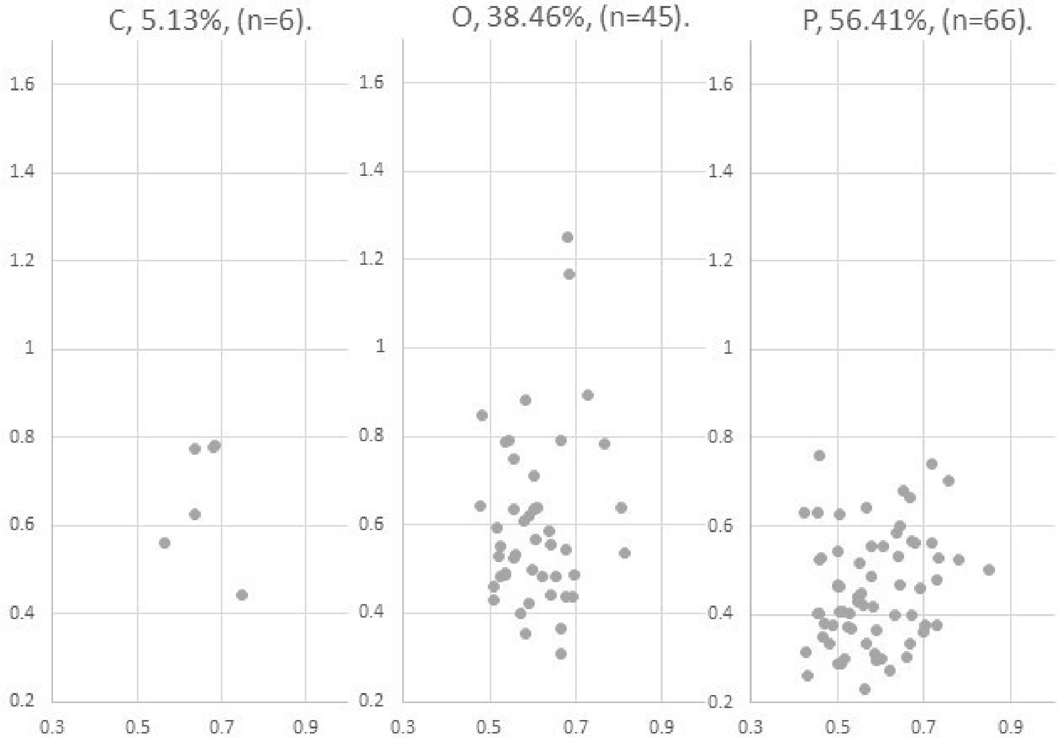
Wolvercote (Lee 2001).



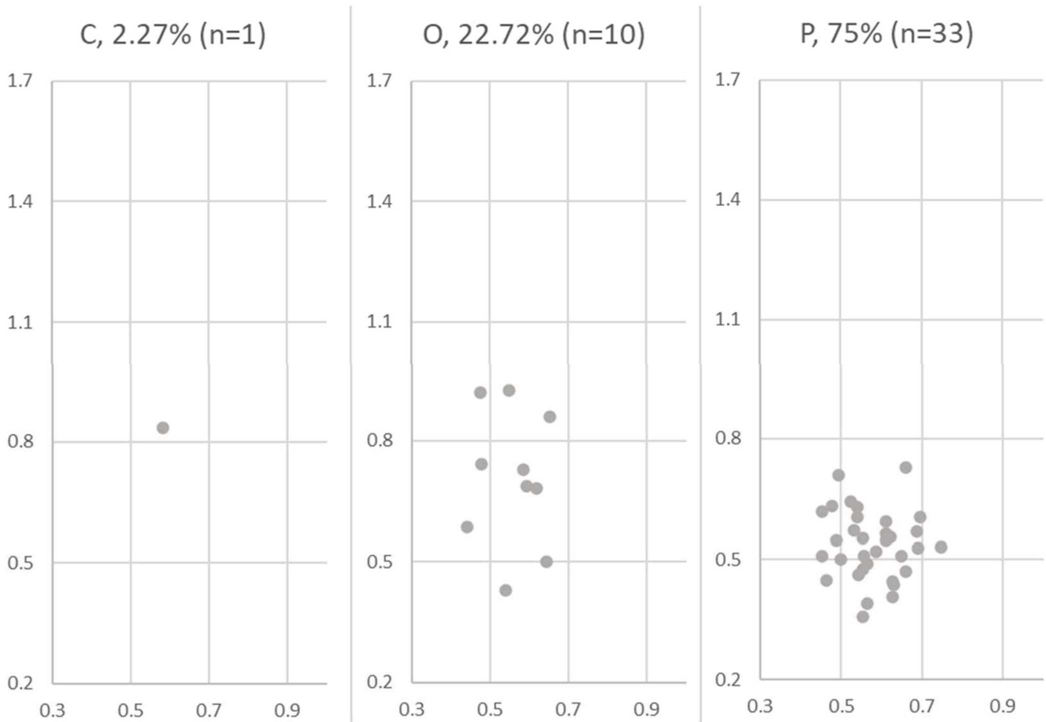
Broom (figure reproduced from Hosfield et al. 2013, Figure 8.14, p. 188), all condition categories.



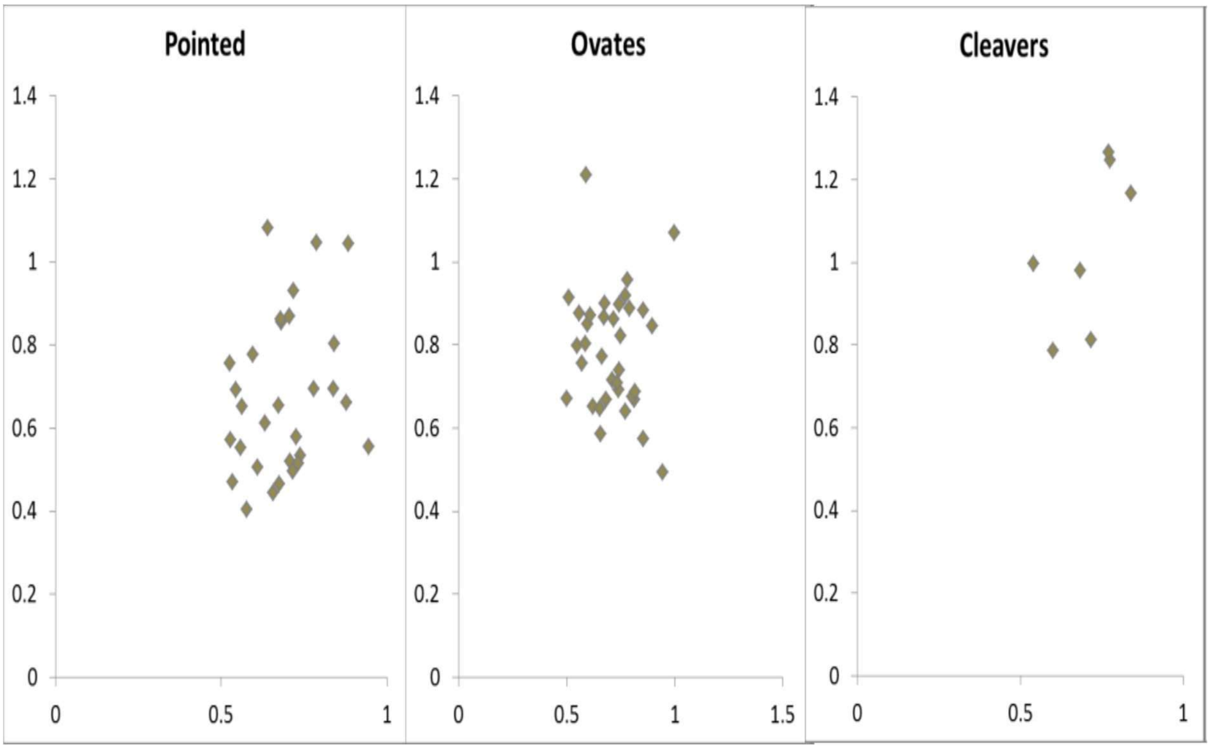
Whitlingham (data from M. White (pers. comm. Nov 2020)), all condition categories.



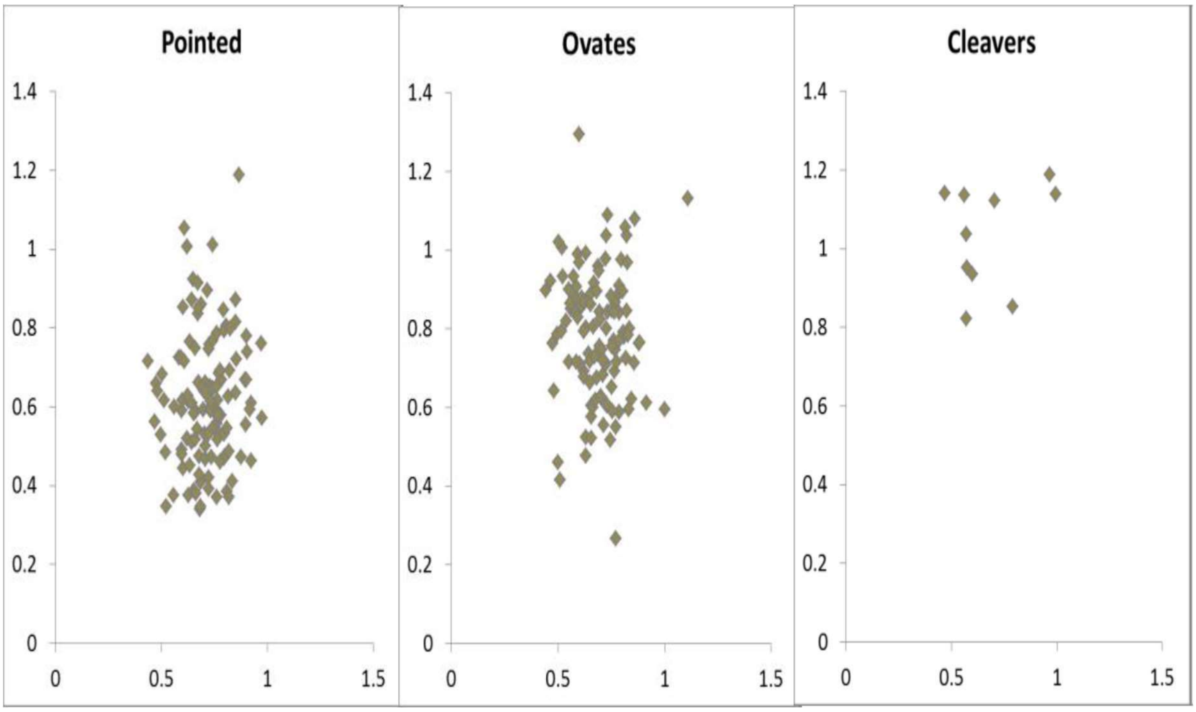
Wolvercote (data from Tyldesley (1986)), all condition categories



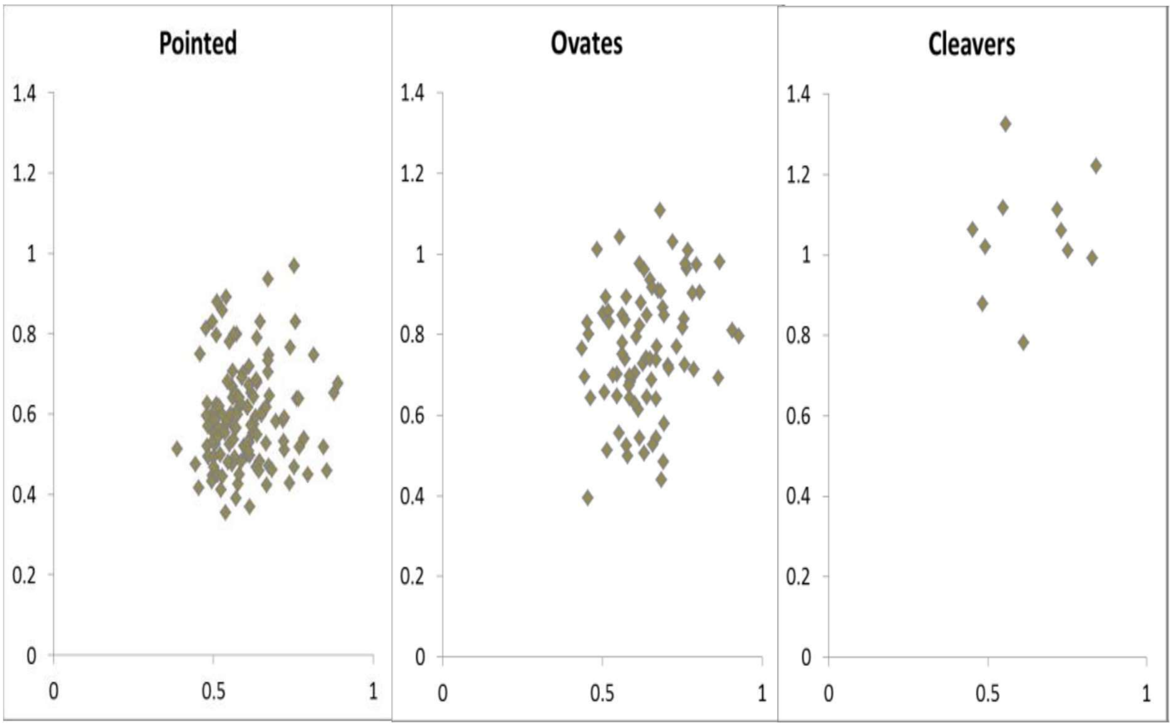
Bemerton (figure reproduced from Egberts 2016, p.184), P= 41.7%, O=47.9%, C=9.6%, all condition categories. Egberts (2016) produced tripartite diagrams to a different scale than Roe (1968a).



Woodgreen (figure reproduced from Egberts 2016, p. 197), P=49.6%, O=46.3%, C=4.1%, all condition categories.

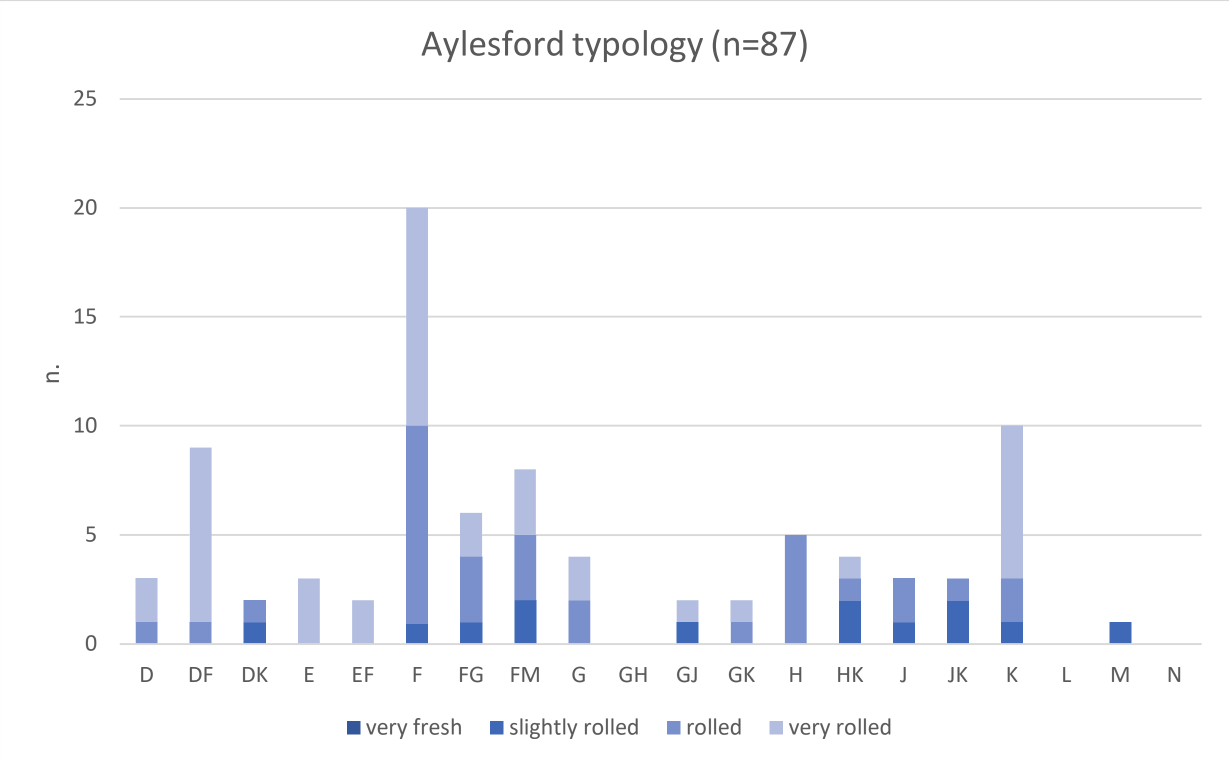


Milford Hill (figure reproduced from Egberts 2016, p191), P=58.1%, O=36.7%, C=5.1%, all condition categories.



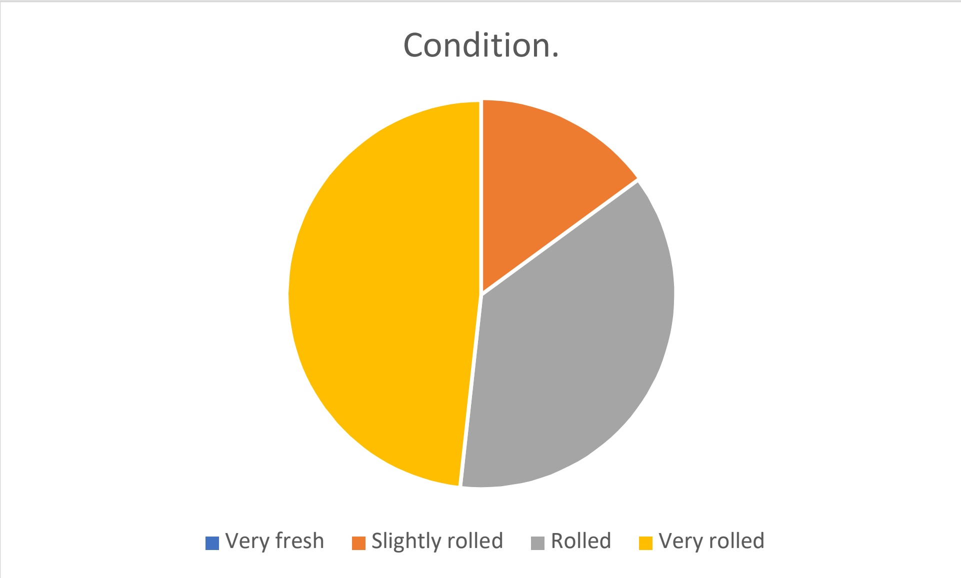
APPENDIX III – RESULTS SUMMARY

Aylesford.

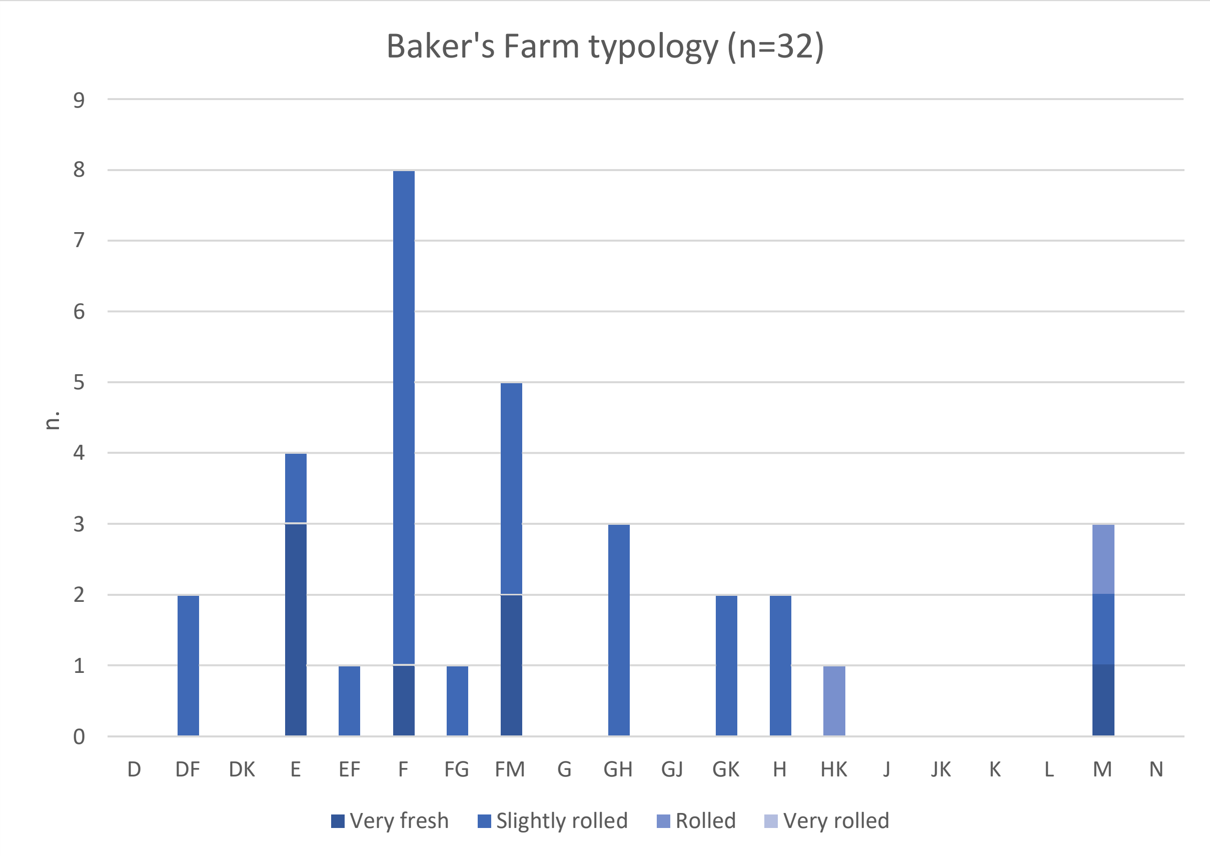


n=87	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	126	76	N/A	36	N/A	43	43	68	17	30
Median	121	76	N/A	35	N/A	40	41	66	16	29
Mode	106	67	N/A	33	N/A	44	36	69	16	33
St. Dev (+/-)	32	14	N/A	9	N/A	14	12	15	4	9
Max.	213	116	N/A	59	N/A	81	98	107	37	55
Min.	58	50	N/A	20	N/A	12	22	40	8	13
CV	26	18	N/A	24	N/A	33	29	22	25	30

n=87	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.48	0.62	0.35	0.65	0.60
Median	0.45	0.60	0.32	0.60	0.57
Mode	0.44	0.67	0.50	0.75	0.45
St. Dev (+/-)	0.09	0.10	0.12	0.19	0.18
Max.	0.74	0.95	0.67	1.14	1.22
Min.	0.24	0.46	0.14	0.30	0.29
CV	19.37	16.15	34.07	29.53	30.71

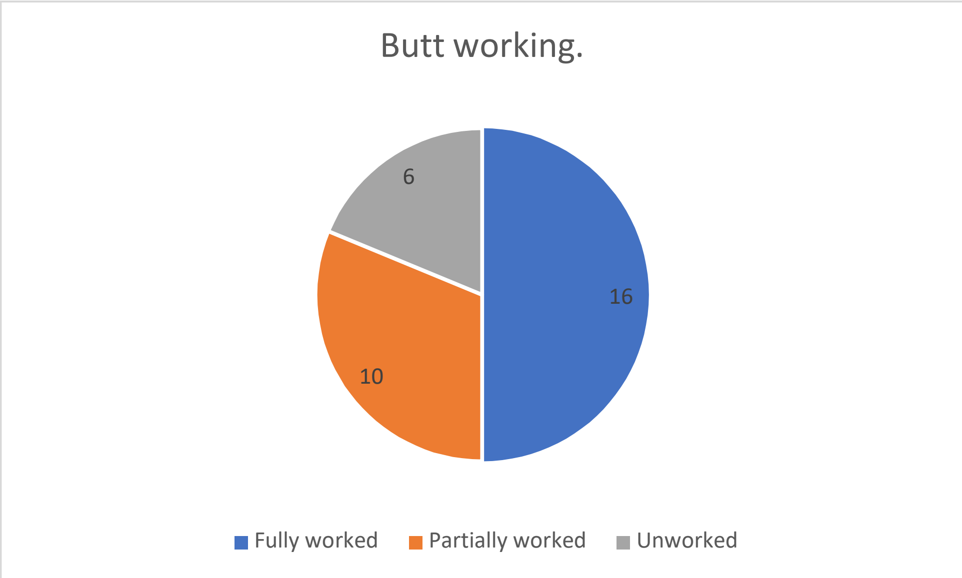

Condition.
Very fresh
Slightly rolled
Rolled
Very rolled

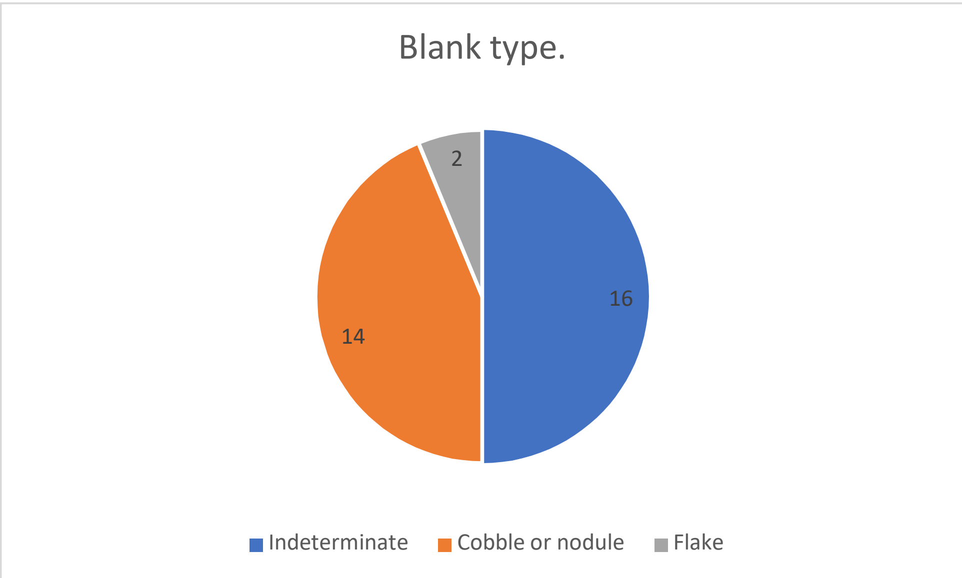
Baker's Farm.

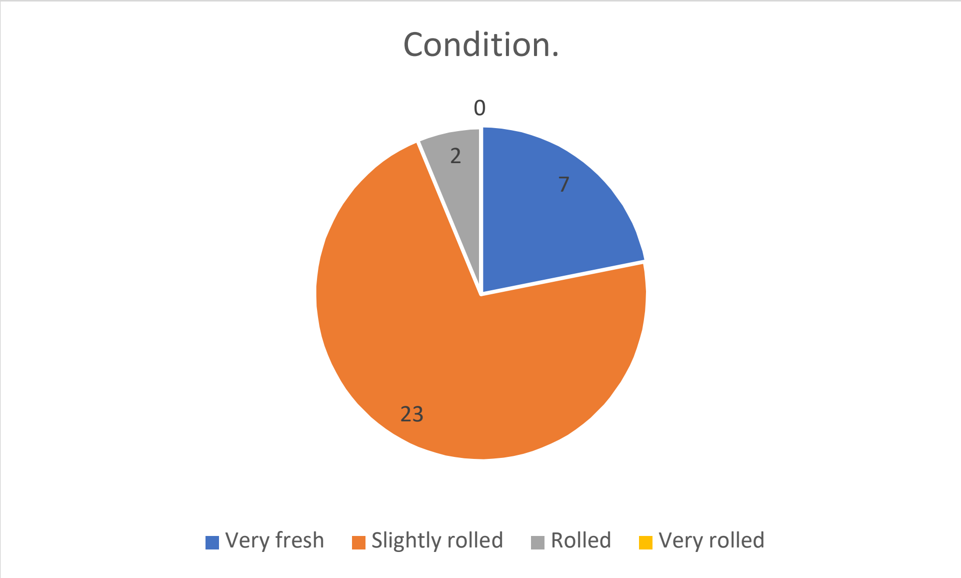


N=32	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	135	77	64	39	366	41	44	71	15	33
Median	128	78	61	37	282	36	41	70	16	31
Mode	124	67	60	32	223	33	38	54	17	31
St. Dev (+/-)	35	16	14	9	202	20	14	17	4	7
Max.	209	102	95	60	771	114	89	99	23	46
Min.	67	42	37	25	60	16	19	33	8	23
CV	25.79	21.21	22.41	22.80	55.26	48.42	32.23	23.35	24.65	20.83

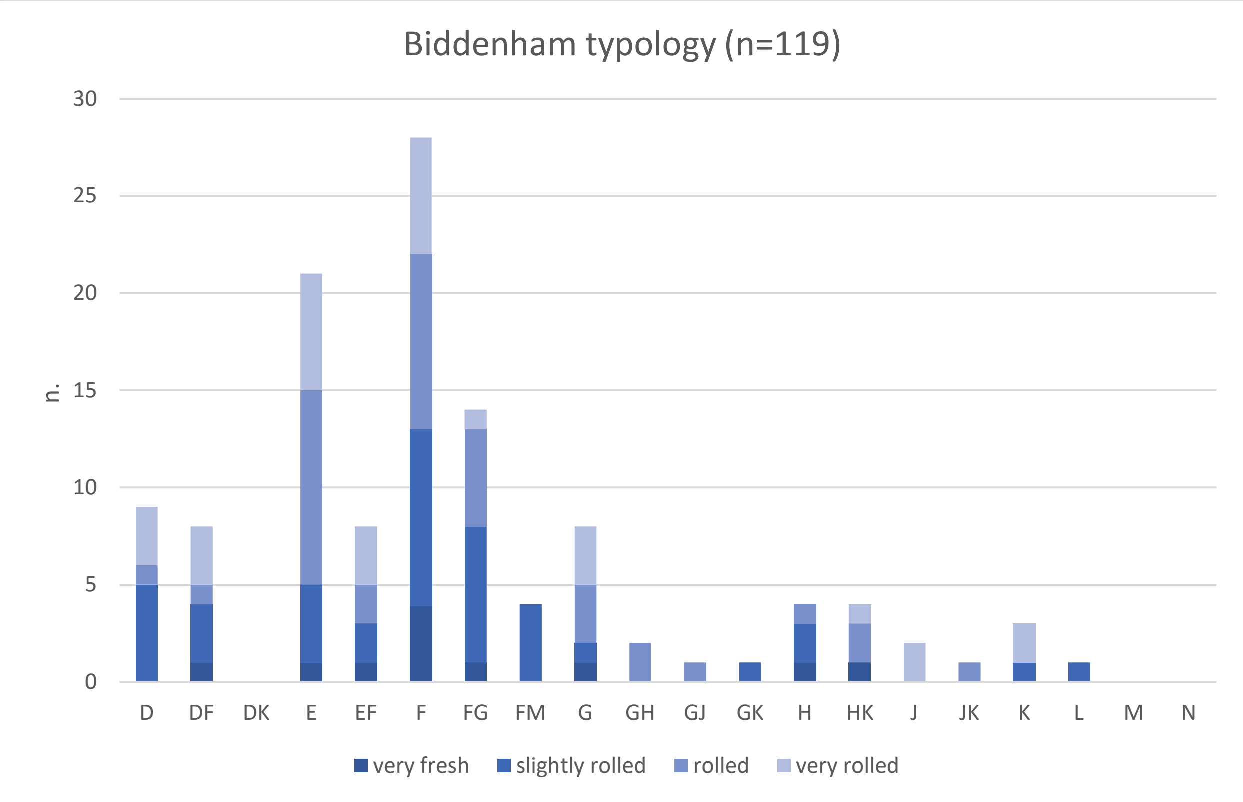
N=32	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.51	0.58	0.31	0.64	0.48
Median	0.50	0.58	0.29	0.58	0.45
Mode	0.50	N/A	0.20	N/A	0.50
St. Dev (+/-)	0.09	0.08	0.12	0.22	0.17
Max.	0.77	0.77	0.71	1.13	1.19
Min.	0.35	0.42	0.15	0.31	0.32
CV	16.99	13.48	39.79	34.39	34.75


Butt working.
6
16
10
Fully worked
Partially worked
Unworked


Blank type.
2
16
14
Indeterminate
Cobble or nodule
Flake

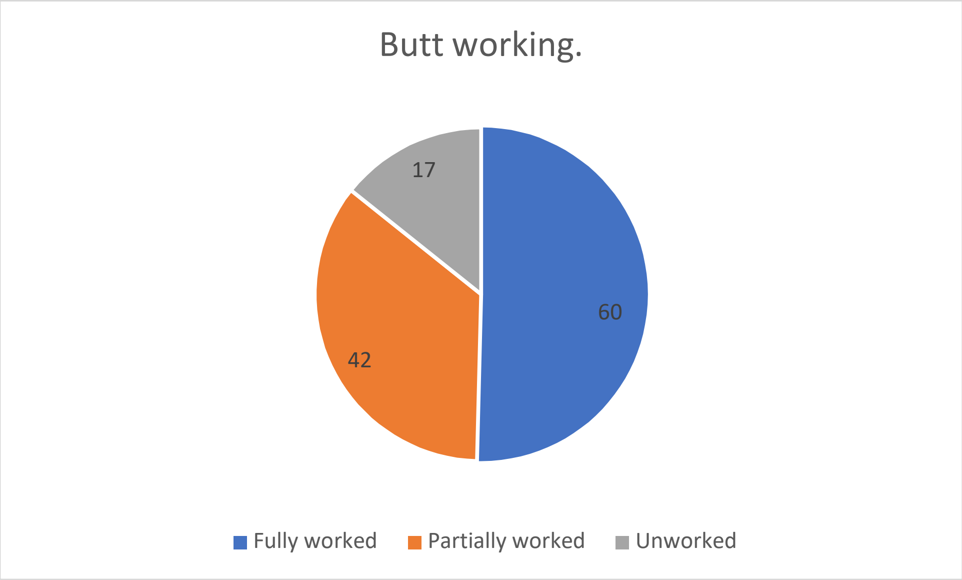

Condition.
0
2
7
23
Very fresh
Slightly rolled
Rolled
Very rolled

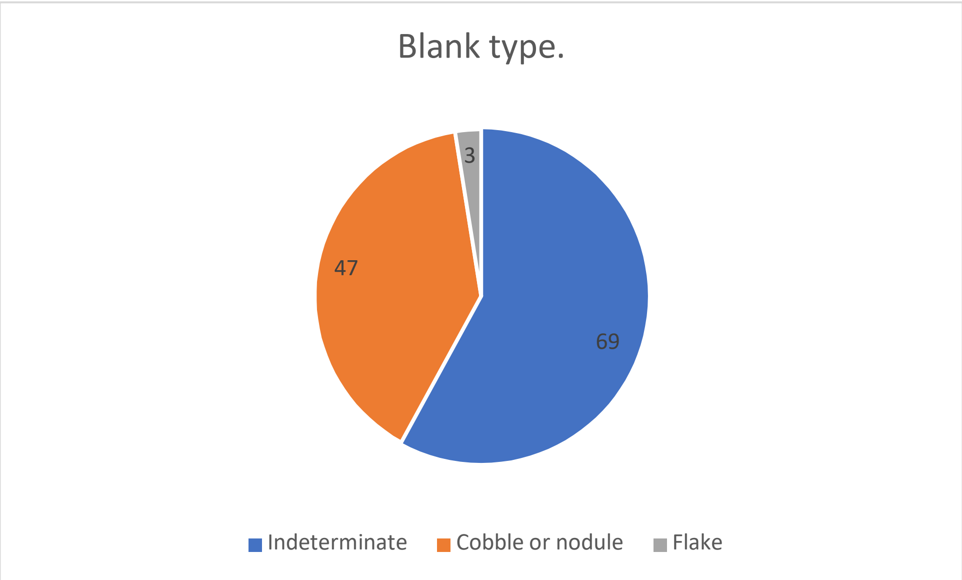
Biddenham.

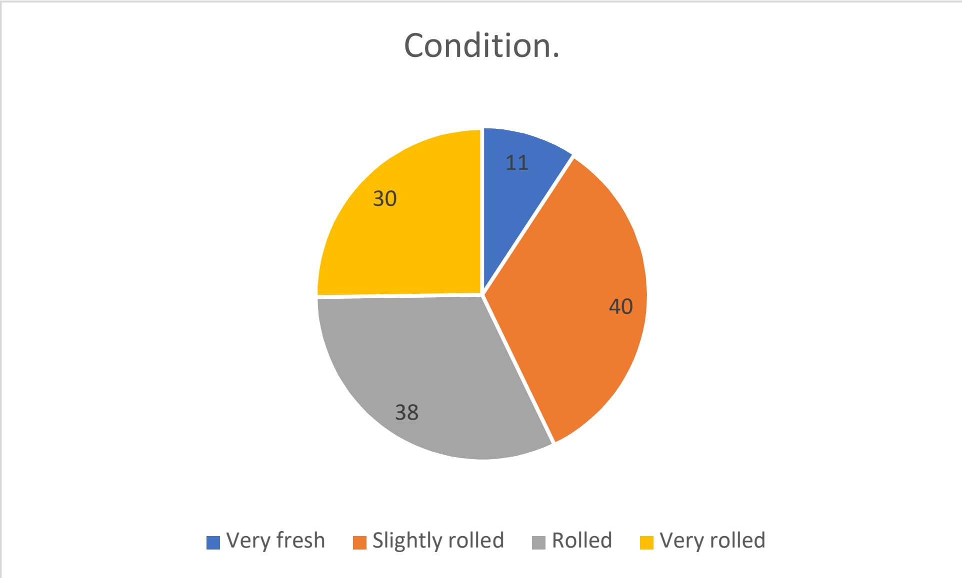


n=119	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	115	71	62	36	297	36	39	63	15	32
Median	107	67	59	35	222	32	36	60	14	31
Mode	97	60	56	33	195	34	35	57	12	32
St. Dev (+/-)	27	17	16	9	207	16	15	15	4	9
Max.	196	121	114	65	881	85	110	114	27	67
Min.	65	41	36	16	85	14	19	32	6	13
CV	23.89	23.57	25.58	25.50	69.64	43.99	37.69	23.78	28.94	29.18

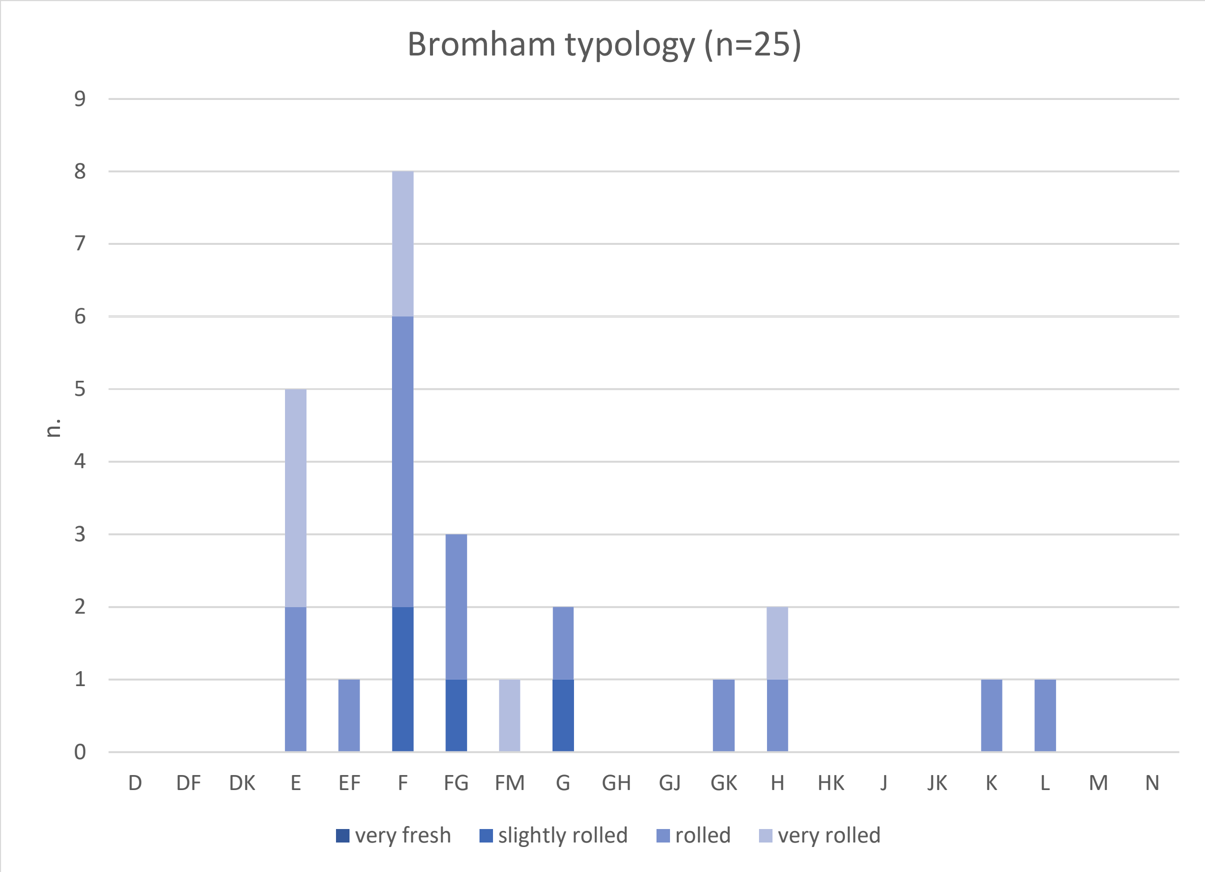
n=119	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.51	0.63	0.31	0.63	0.49
Median	0.51	0.63	0.30	0.60	0.46
Mode	0.50	0.55	0.30	0.72	0.50
St. Dev (+/-)	0.11	0.09	0.11	0.18	0.16
Max.	0.81	0.94	0.71	1.29	1.00
Min.	0.27	0.47	0.12	0.35	0.23
CV	21.24	14.64	35.81	28.23	32.73


Butt working.
17
60
42
Fully worked
Partially worked
Unworked


Blank type.
3
47
69
Indeterminate
Cobble or nodule
Flake

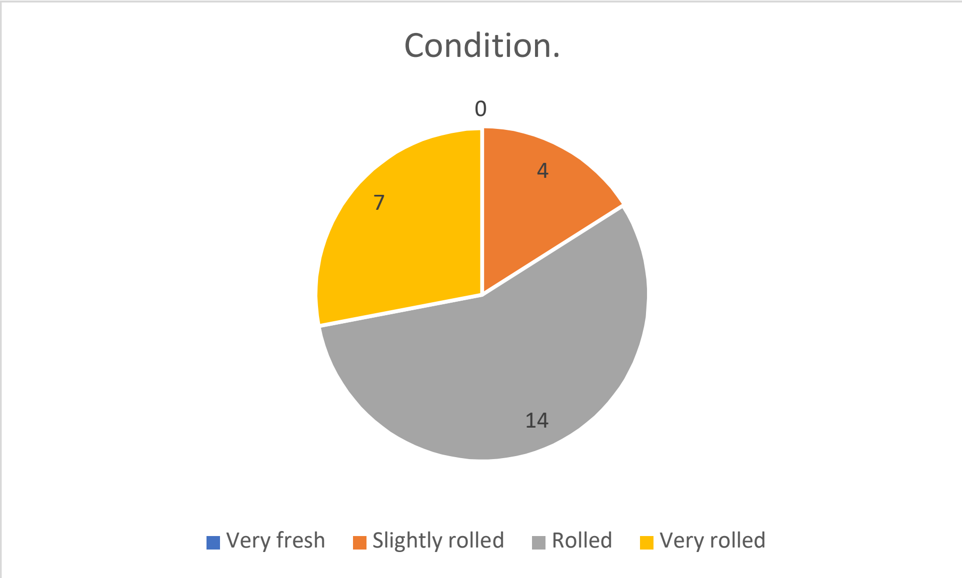

Condition.
11
40
38
30
Very fresh
Slightly rolled
Rolled
Very rolled

Bromham.

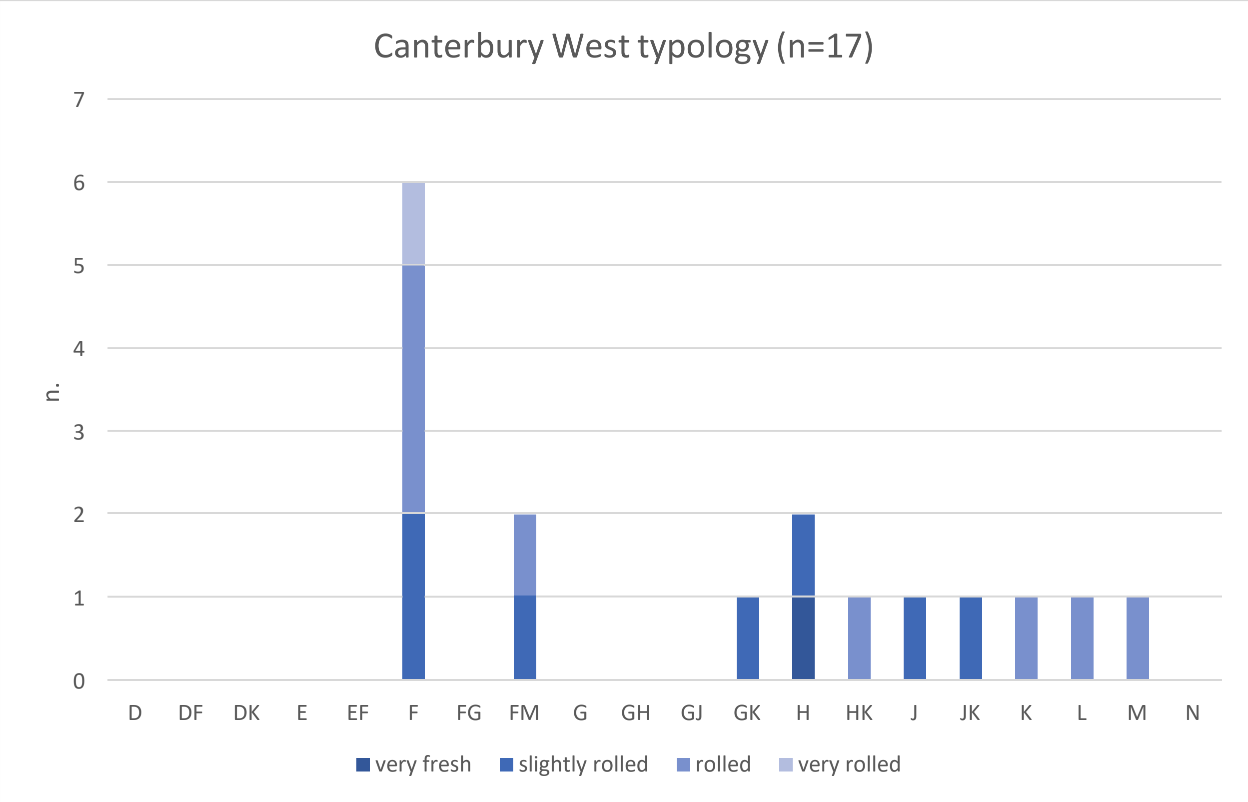


	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	124	72	N/A	36	N/A	40	41	65	16	30
Median	118	75	N/A	35	N/A	39	39	68	16	29
Mode	125	83	N/A	33	N/A	39	39	71	13	37
St. Dev (+/-)	28	13	N/A	7	N/A	12	15	12	4	7
Max.	181	92	N/A	47	N/A	64	81	86	25	42
Min.	79	47	N/A	23	N/A	19	16	40	9	18
CV	22.46	17.29	N/A	19.90	N/A	31.04	37.62	19	26.85	23.34

	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.49	0.59	0.33	0.62	0.55
Median	0.49	0.57	0.33	0.59	0.51
Mode	N/A	N/A	N/A	N/A	0.54
St. Dev (+/-)	0.07	0.10	0.10	0.19	0.16
Max.	0.62	0.83	0.57	1.08	1.11
Min.	0.34	0.45	0.15	0.37	0.34
CV	13.83	16.18	29.18	29.80	29.13

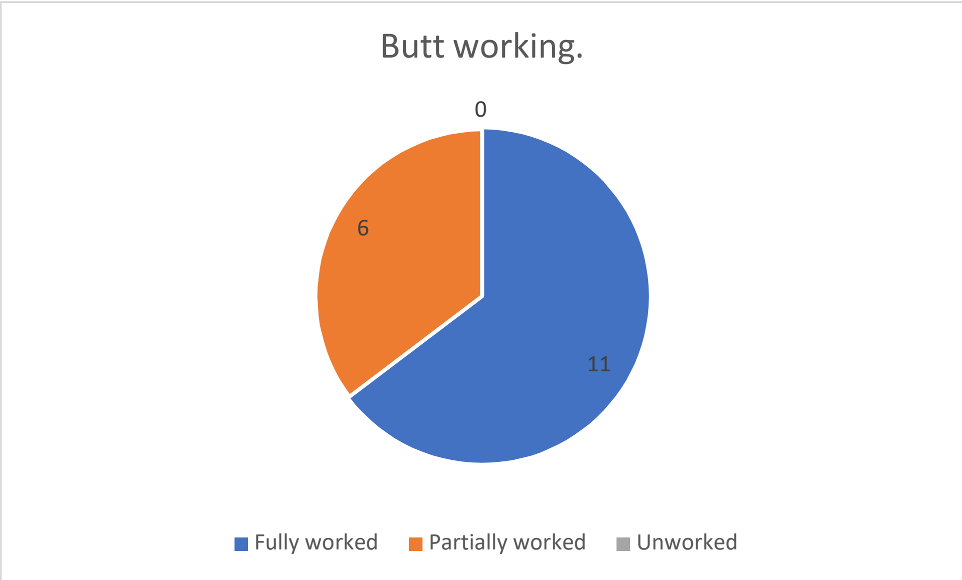

Condition.
0
4
7
14
Very fresh
Slightly rolled
Rolled
Very rolled

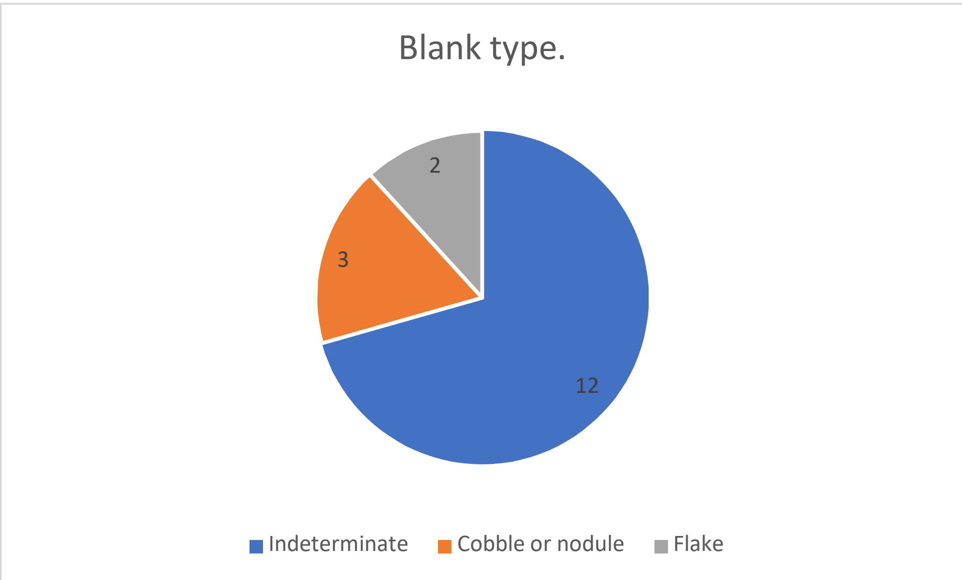
Canterbury West.

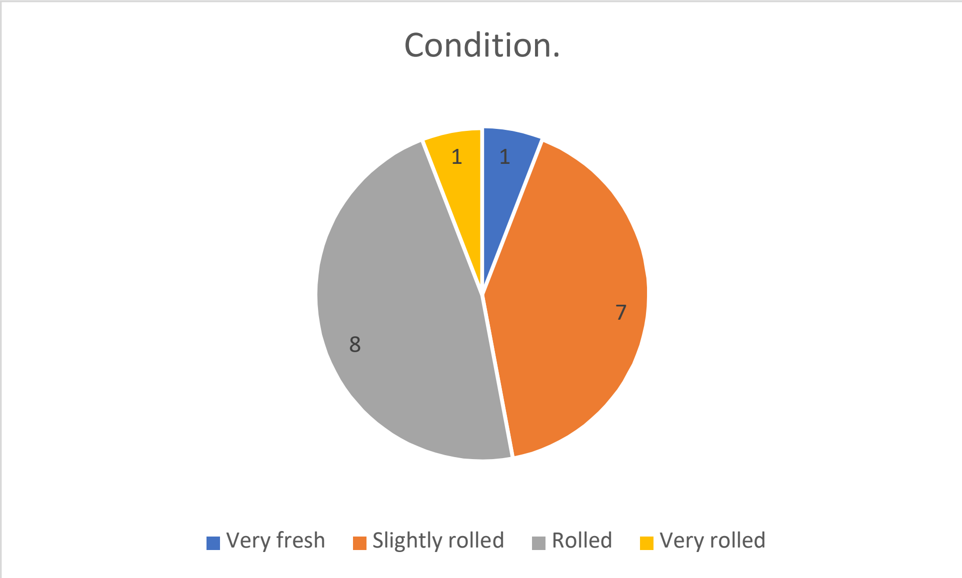


n=17	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	151	84	N/A	41	N/A	48	47	77	17	35
Median	147	87	N/A	41	N/A	45	41	78	17	33
Mode	N/A	N/A	N/A	48	N/A	28	31	83	14	28
St. Dev (+/-)	40	17	N/A	12	N/A	22	20	17	4	12
Max.	223	103	N/A	62	N/A	87	88	101	25	61
Min.	81	46	N/A	18	N/A	20	27	39	13	13
CV	26.31	20.40	N/A	28.73	N/A	46.13	41.60	21.80	22.10	34.45

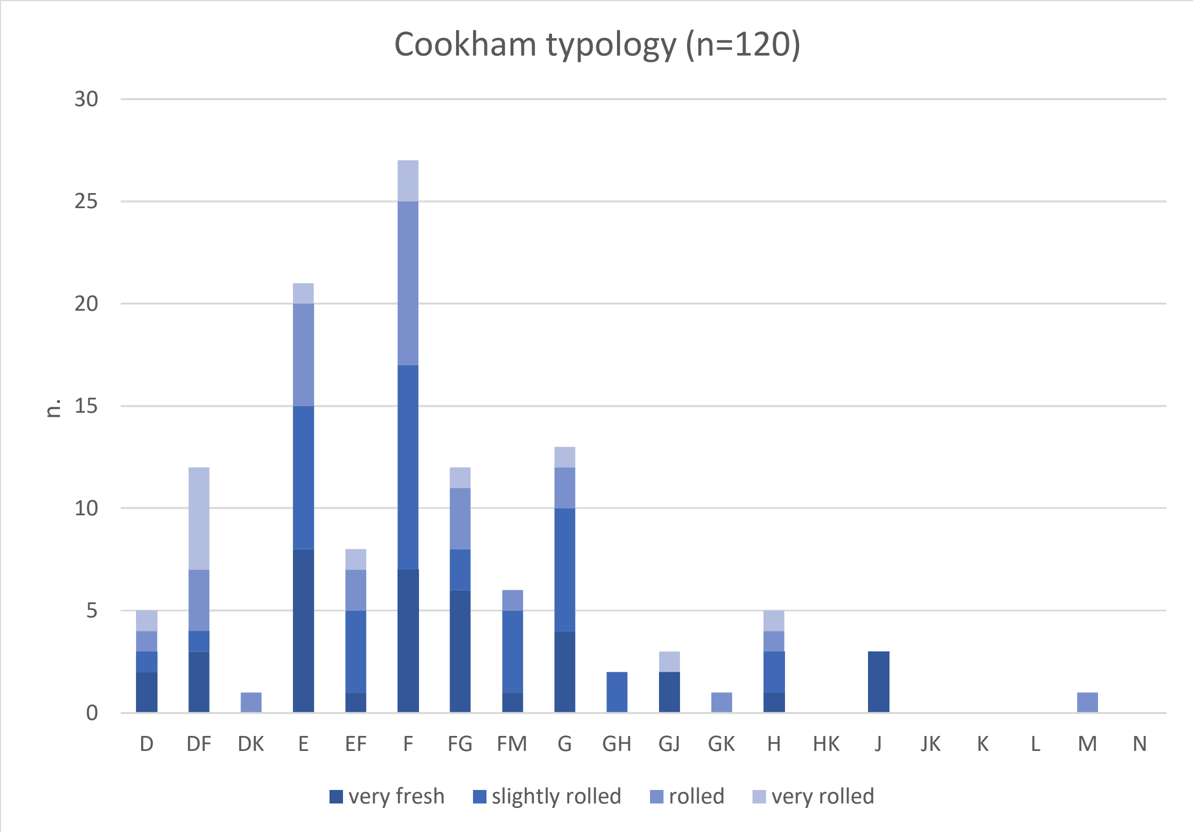
n=17	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.49	0.57	0.33	0.62	0.57
Median	0.50	0.55	0.27	0.53	0.46
Mode	N/A	N/A	N/A	N/A	N/A
St. Dev (+/-)	0.10	0.11	0.16	0.24	0.27
Max.	0.65	0.74	0.63	1.06	1.08
Min.	0.28	0.37	0.11	0.32	0.28
CV	20.98	18.56	48.38	39.03	47.36


Butt working.
0
6
11
Fully worked
Partially worked
Unworked


Blank type.
2
3
12
Indeterminate
Cobble or nodule
Flake

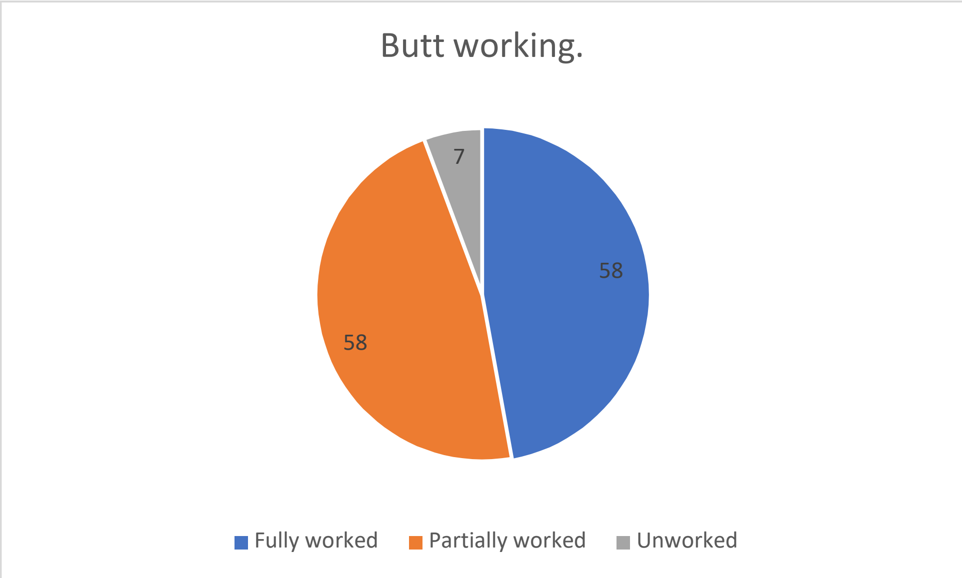

Condition.
1
1
7
8
Very fresh
Slightly rolled
Rolled
Very rolled

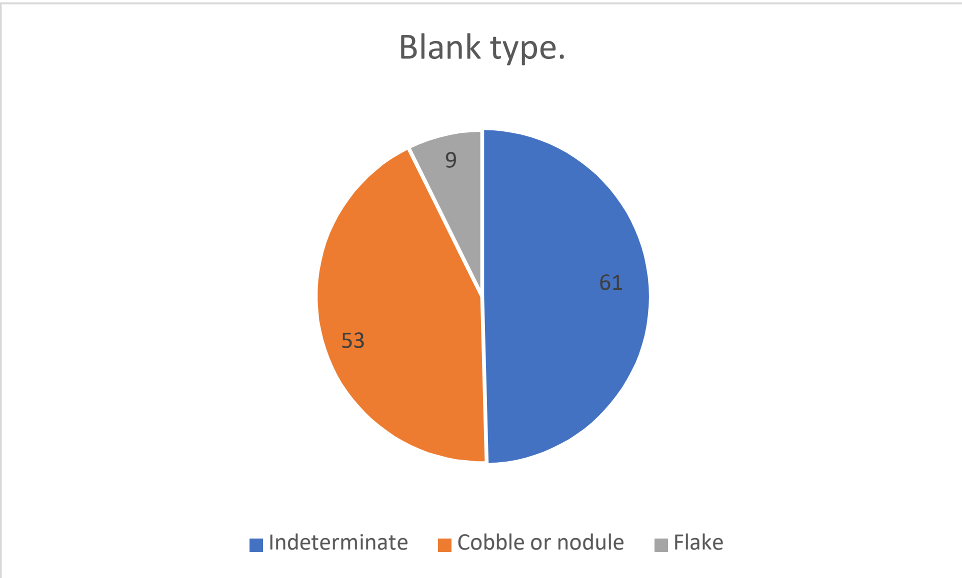
Cookham.

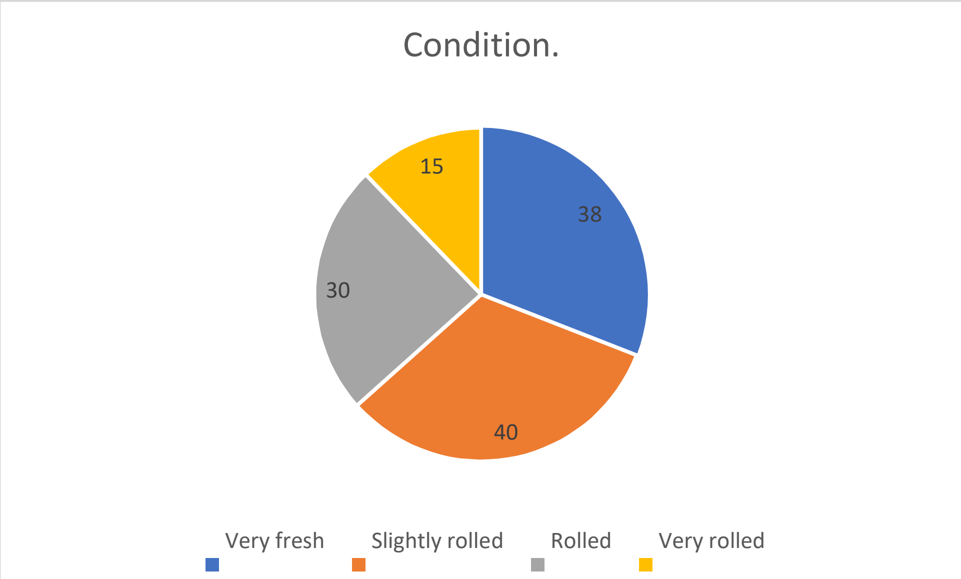


n=123	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	115	68	58	39	296	35	40	58	17	32
Median	106	65	56	36	212	32	36	58	15	32
Mode	105	64	50	33	177	25	33	57	13	32
St. Dev (+/-)	28	14	14	10	225	16	14	15	7	10
Max.	230	111	100	80	1542	95	85	109	55	60
Min.	65	42	37	19	59	9	20	21	7	10
CV	24.63	20.42	23.15	25.07	76.03	45.40	35.30	25.90	42.97	31.19

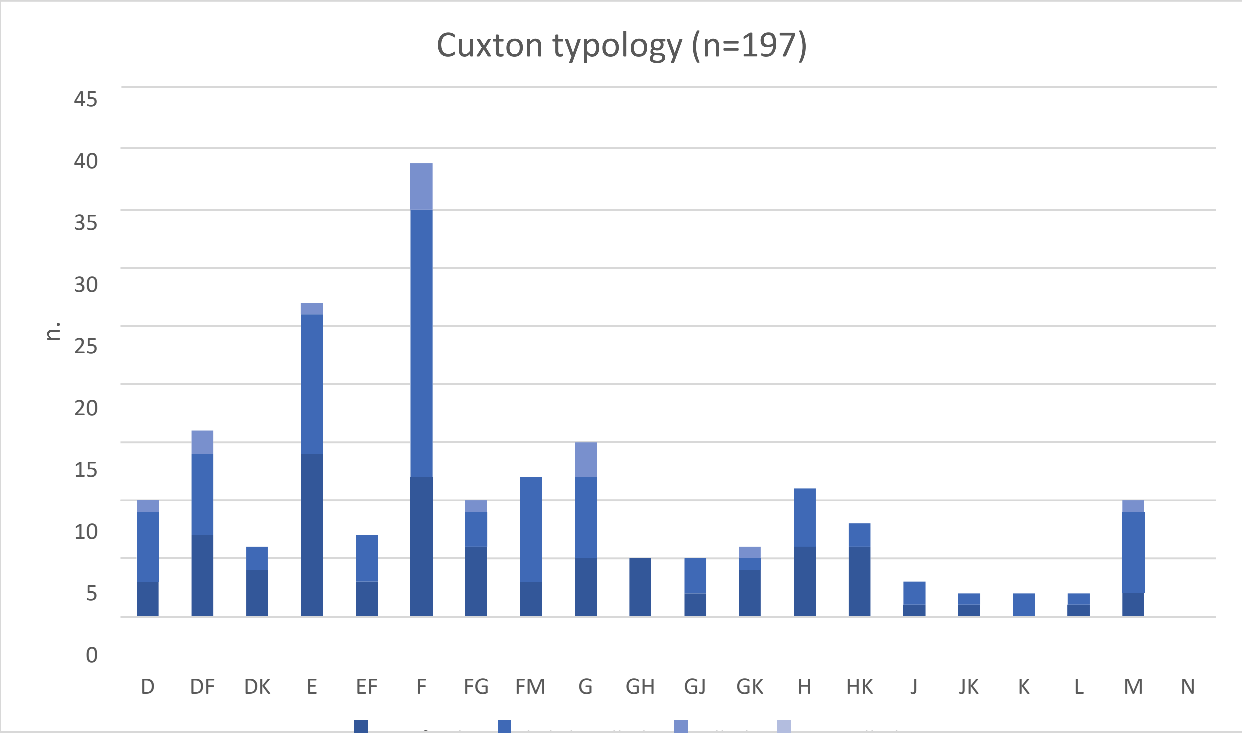
n=123	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.58	0.60	0.30	0.75	0.60
Median	0.57	0.60	0.29	0.63	0.46
Mode	0.80	0.62	0.24	0.55	0.50
St. Dev (+/-)	0.11	0.08	0.11	0.46	0.53
Max.	0.84	0.81	0.70	2.96	3.44
Min.	0.36	0.41	0.10	0.31	0.24
CV	19.71	12.91	35.18	60.77	87.53


Butt working.
7
58
58
Fully worked
Partially worked
Unworked


Blank type.
9
61
53
Indeterminate
Cobble or nodule
Flake

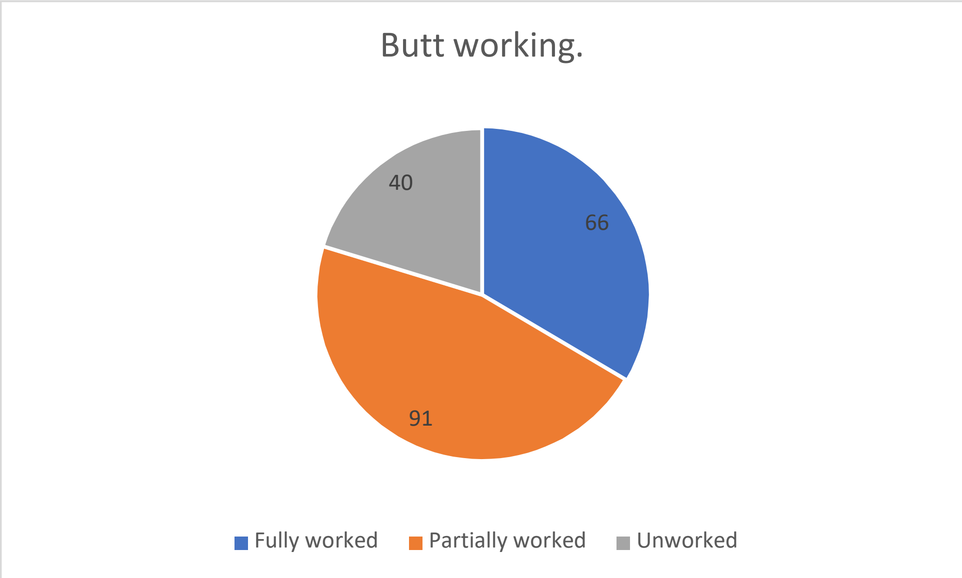

Condition.
15
38
30
40
Very fresh
Slightly rolled
Rolled
Very rolled

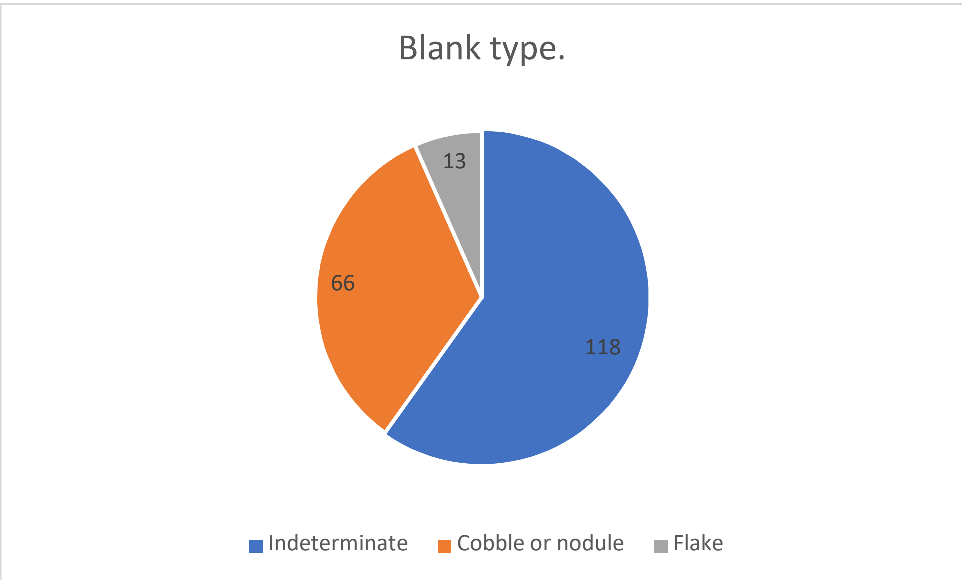
Cuxton.

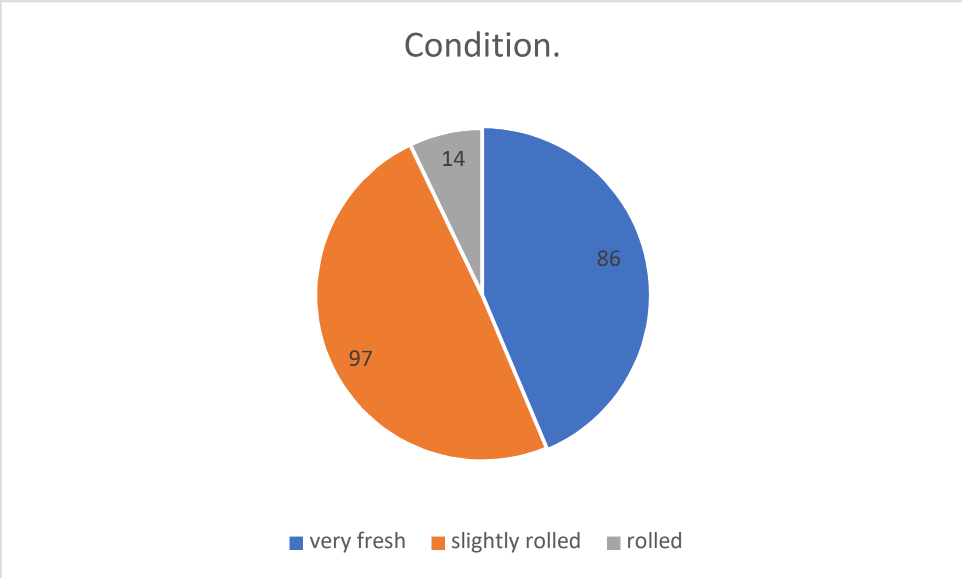


n=197	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	124	71	62	42	378	39	41	63	15	35
Median	121	69	60	41	303	36	39	62	15	35
Mode	122	58	54	36	196	27	35	59	15	37
St. Dev (+/-)	36	16	16	11	263	18	15	15	5	11
Max.	254	115	108	72	1231	111	90	105	32	70
Min.	67	34	27	18	42	7	6	31	5	9
CV	28.72	22.23	25.88	26.90	69.72	45.61	36.21	24.17	33.50	31.93

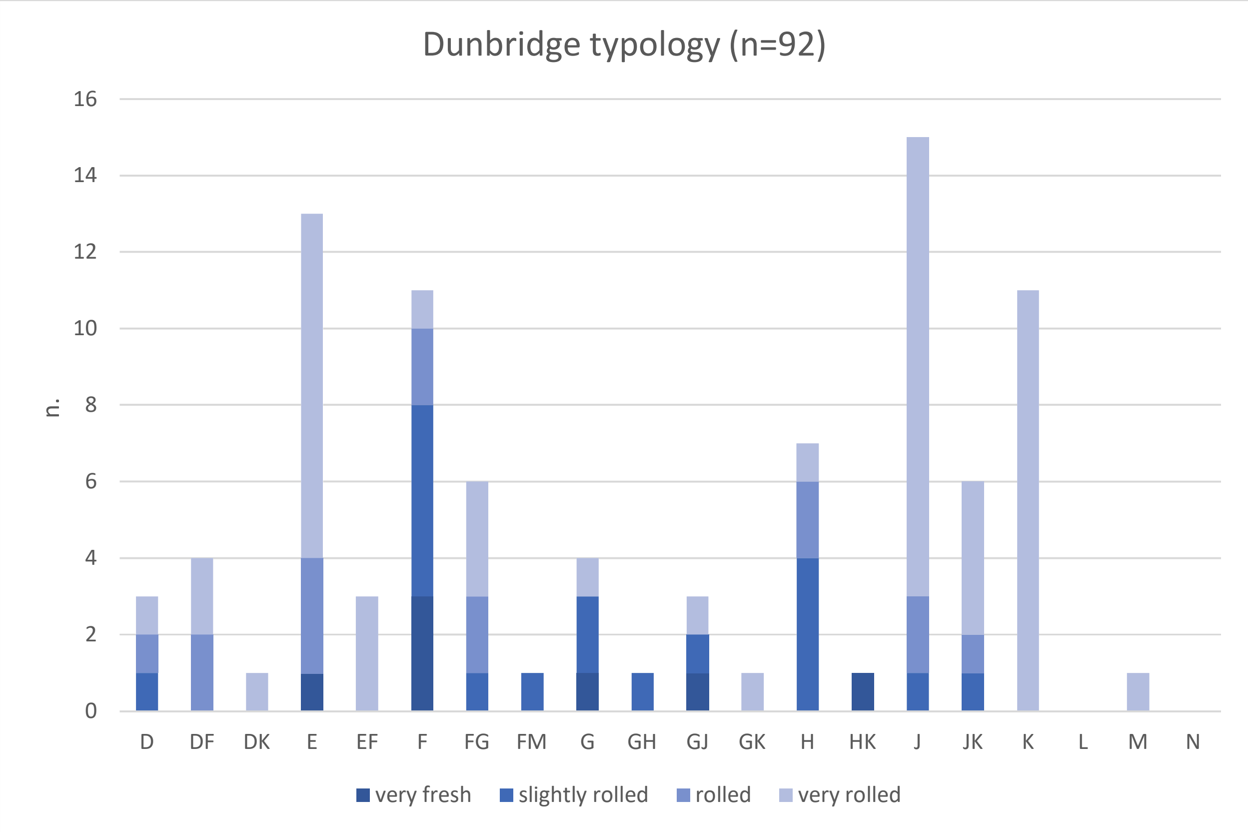
n=27	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.59	0.59	0.32	0.67	0.46
Median	0.57	0.59	0.31	0.64	0.42
Mode	0.67	0.60	0.20	0.48	0.40
St. Dev (+/-)	0.14	0.09	0.12	0.21	0.17
Max.	1.09	0.85	0.64	1.41	1.08
Min.	0.27	0.31	0.07	0.17	0.19
CV	23.06	15.88	36.56	30.75	37.33


Butt working.
40
66
91
Fully worked
Partially worked
Unworked


Blank type.
13
66
118
Indeterminate
Cobble or nodule
Flake

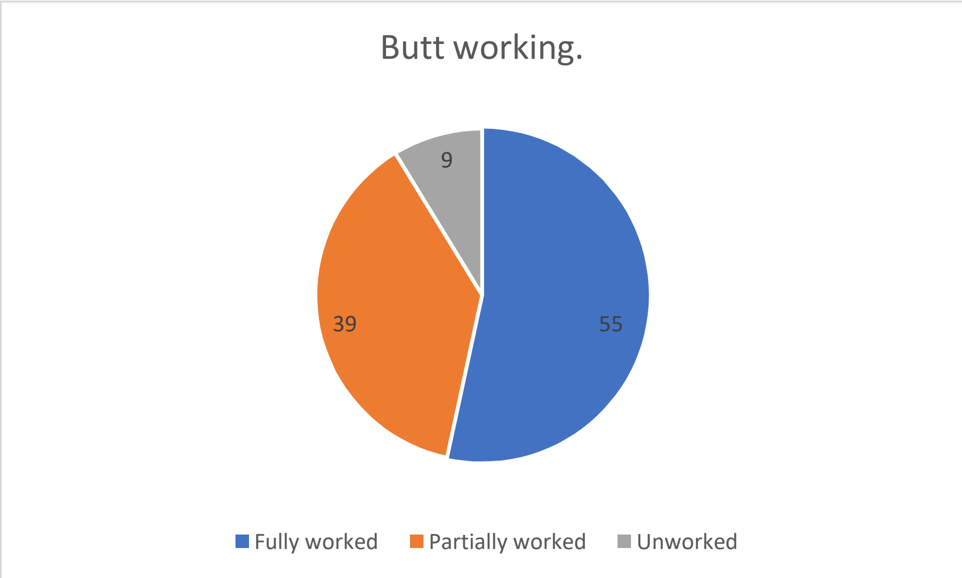

Condition.
14
86
97
very fresh
slightly rolled
rolled

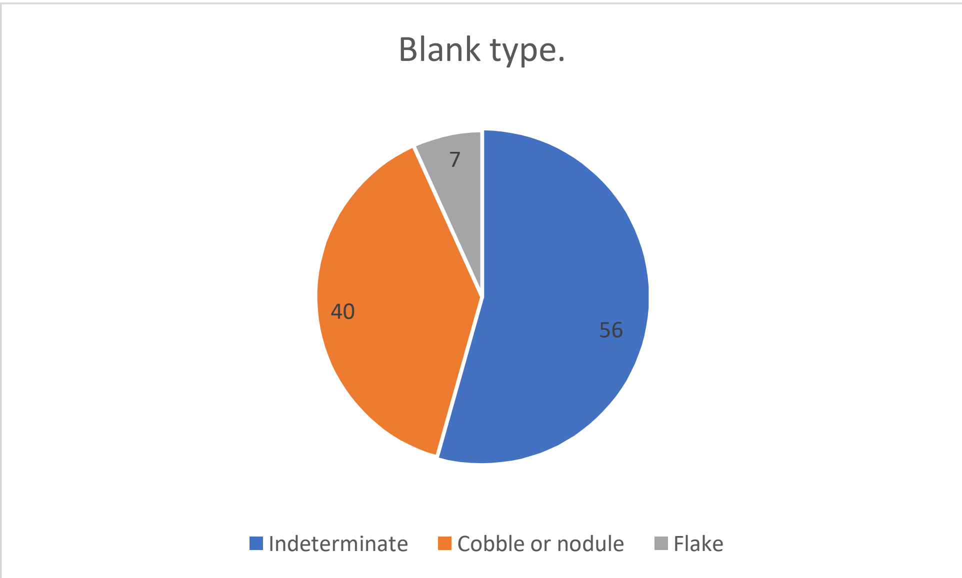
Dunbridge.

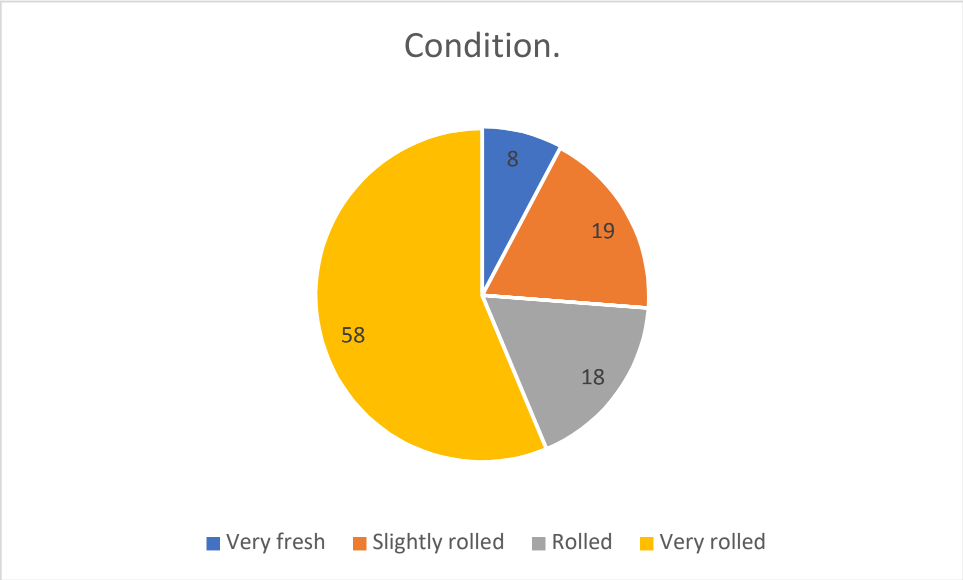


n=103	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	113	72	66	36	299	37	44	64	17	30
Median	108	72	64	34	259	36	42	64	17	28
Mode	130	76	59	26	317	38	35	77	13	27
St. Dev (+/-)	29	13	13	9	166	15	13	12	5	7
Max.	195	101	91	63	850	99	74	94	33	58
Min.	70	35	28	10	30	9	13	34	7	9
CV	25.67	18.01	19.05	25.03	55.66	40.75	30.49	19.26	29.17	31.95

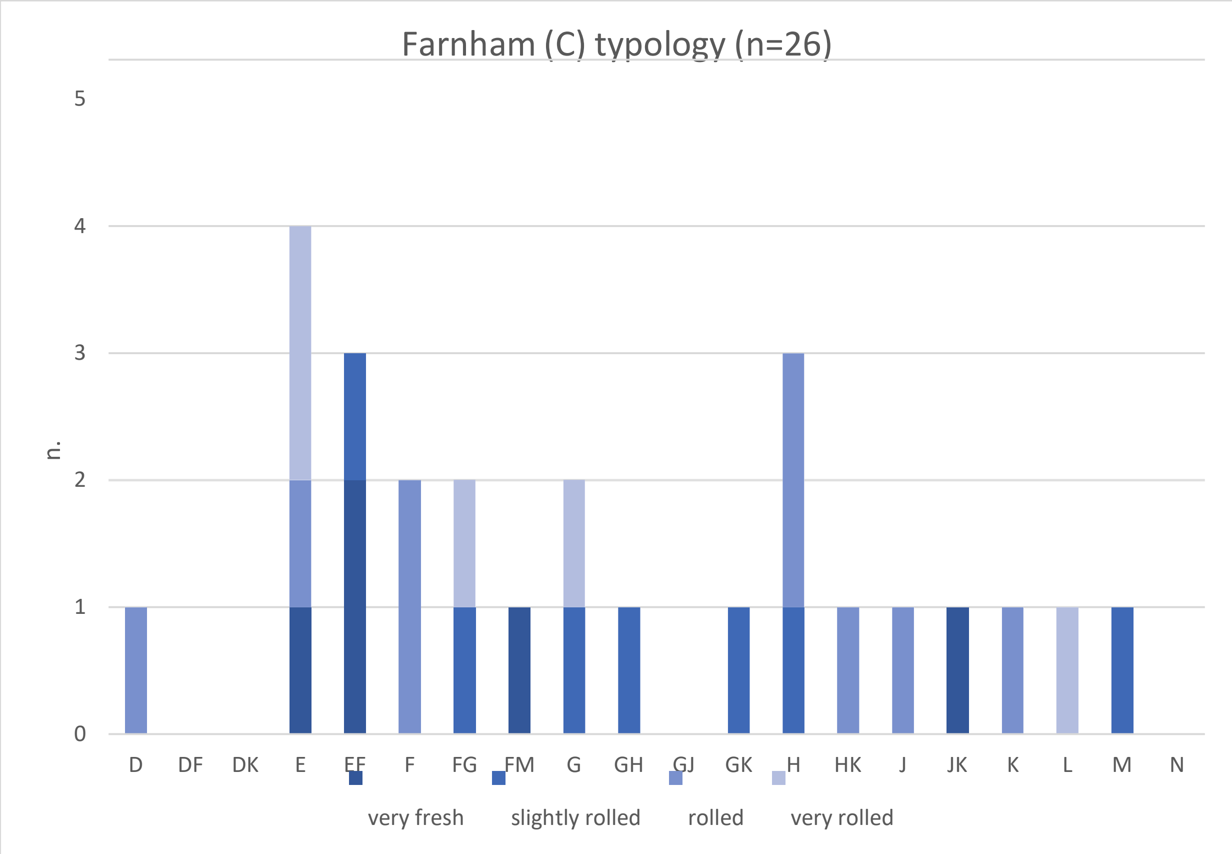
n=103	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.50	0.66	0.33	0.69	0.16
Median	0.49	0.66	0.32	0.69	0.15
Mode	0.57	0.67	0.38	0.50	0.08
St. Dev (+/-)	0.11	0.12	0.10	0.19	0.06
Max.	0.77	1.00	0.64	1.36	0.38
Min.	0.29	0.39	0.08	0.35	0.07
CV	21.15	18.79	29.78	27.74	36.50


Butt working.
9
39
55
Fully worked
Partially worked
Unworked


Blank type.
7
40
56
Indeterminate
Cobble or nodule
Flake

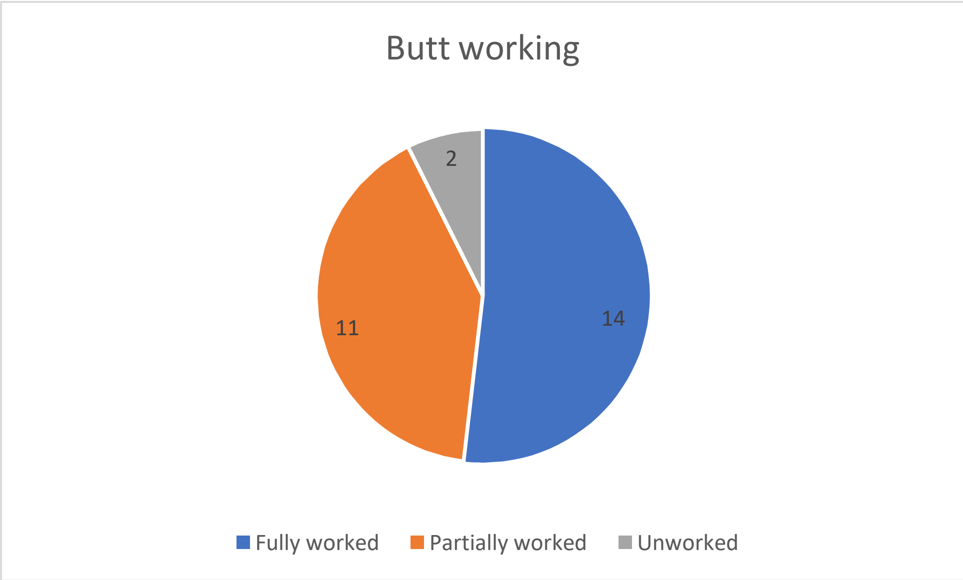

Condition.
8
19
18
58
Very fresh
Slightly rolled
Rolled
Very rolled

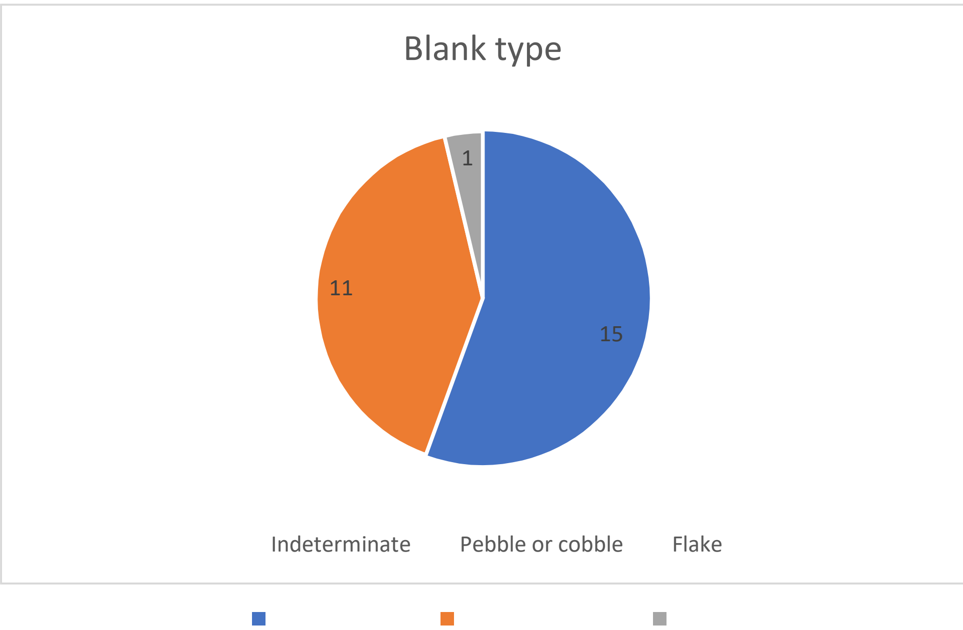
Farnham C.

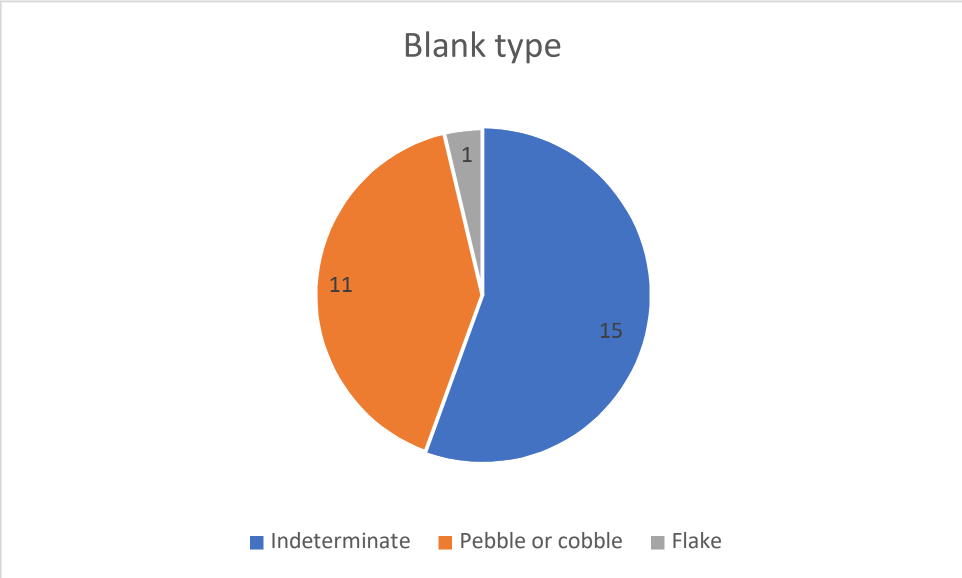


n=27	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	112	73	67	36	N/A	39	47	64	17	29
Median	116	74	67	36	N/A	38	41	63	17	31
Mode	91	74	46	35	N/A	49	31	52	17	33
St. Dev (+/-)	27	19	21	8	N/A	18	19	14	5	7
Max.	154	115	113	50	N/A	83	92	93	27	42
Min.	58	47	35	21	N/A	10	22	43	8	16
CV	23.84	26.68	31.11	23.41	N/A	47.51	40.84	21.67	28.85	24.35

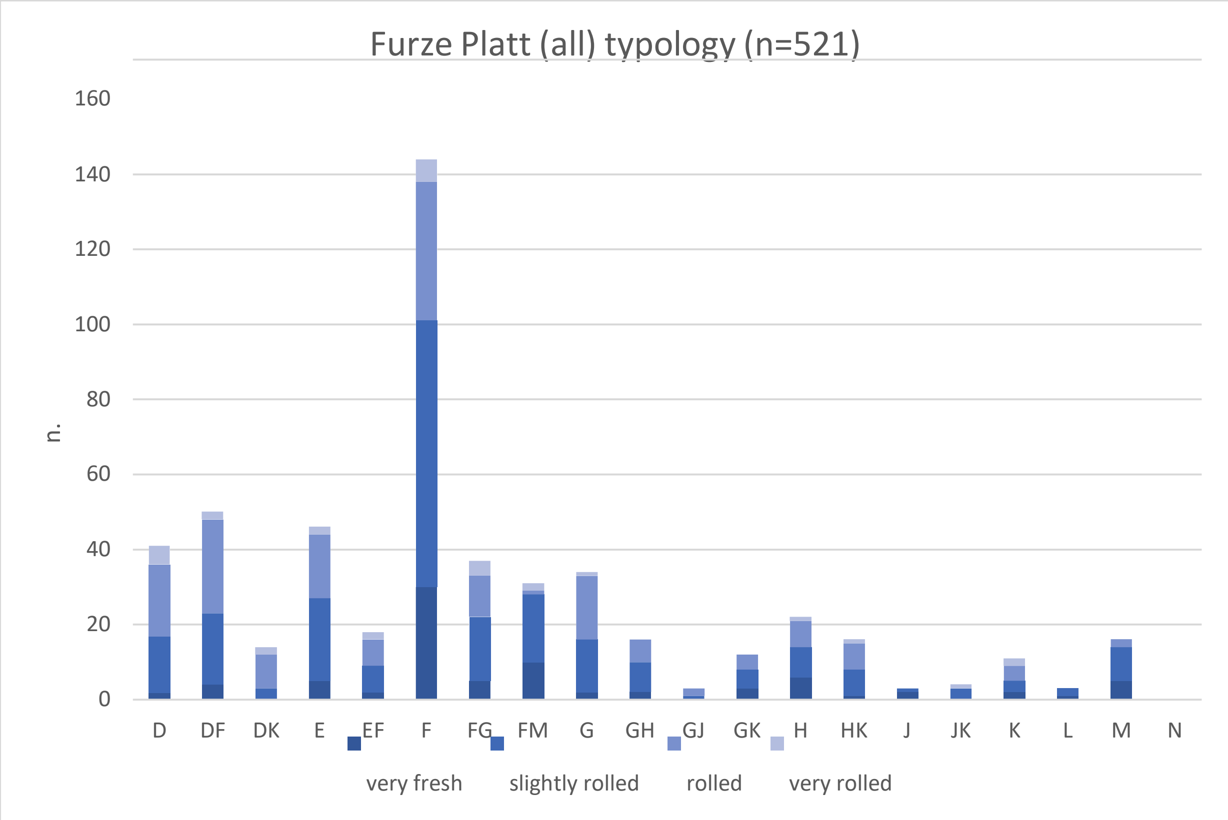
n=27	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.51	0.66	0.34	0.72	0.59
Median	0.53	0.64	0.32	0.68	0.57
Mode	0.56	N/A	N/A	0.65	0.50
St. Dev (+/-)	0.14	0.13	0.12	0.21	0.20
Max.	0.92	0.97	0.60	1.19	1.06
Min.	0.30	0.43	0.11	0.40	0.26
CV	27.57	18.95	36.39	29.28	33.11


Butt working
2
11
14
Fully worked
Partially worked
Unworked


Blank type
1
11
15
Indeterminate
Pebble or cobble
Flake

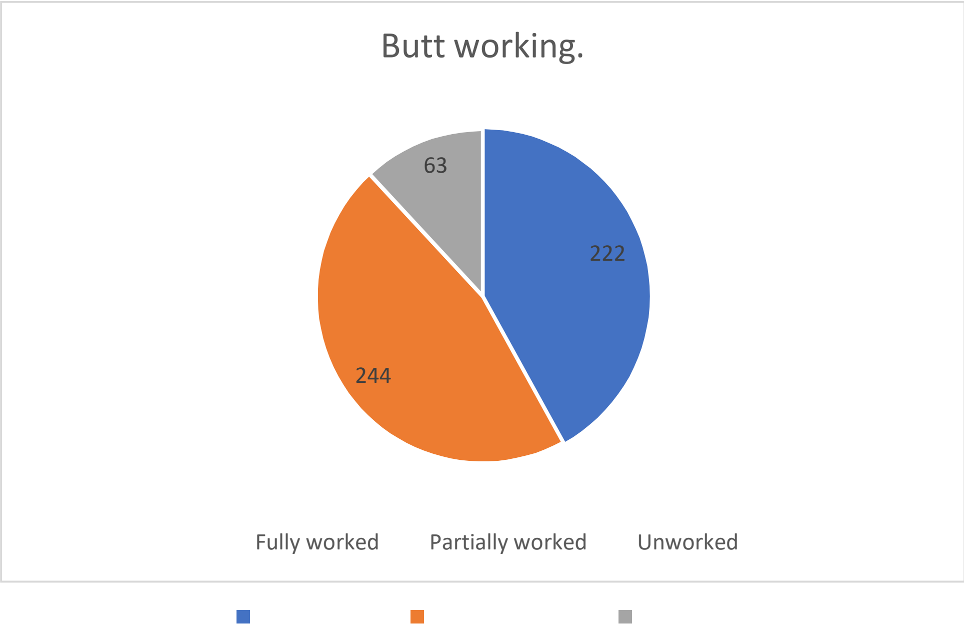

Blank type
1
11
15
Indeterminate
Pebble or cobble
Flake

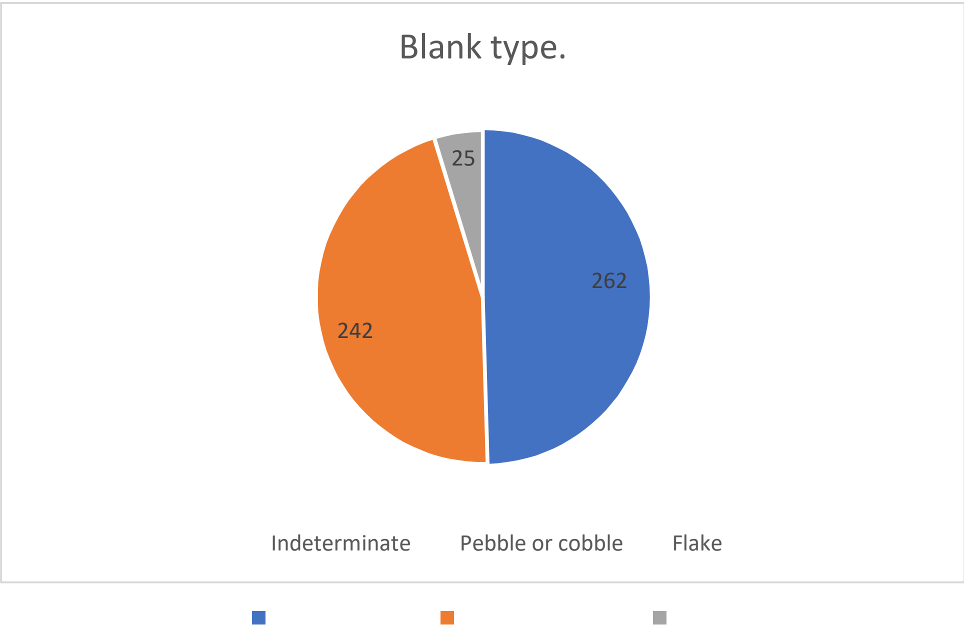
Furze Platt.

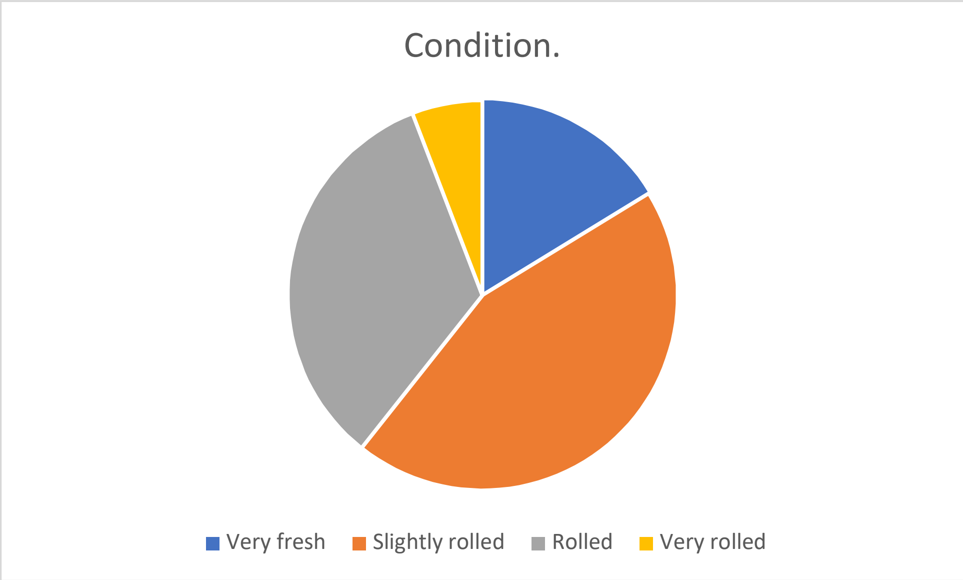


n=529	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	125	71	61	40	336	38	39	64	15	35
Median	120	70	54	39	288	36	37	63	14	34
Mode	97	65	54	37	131	34	27	64	14	28
St. Dev (+/-)	29	15	14	9	200	15	13	14	4	9
Max.	242	124	111	72	1190	148	107	124	36	66
Min.	65	37	31	21	51	4	17	34	6	12
CV	23.49	20.46	22.81	21.73	59.59	40.76	32.78	22.41	27.69	25.14

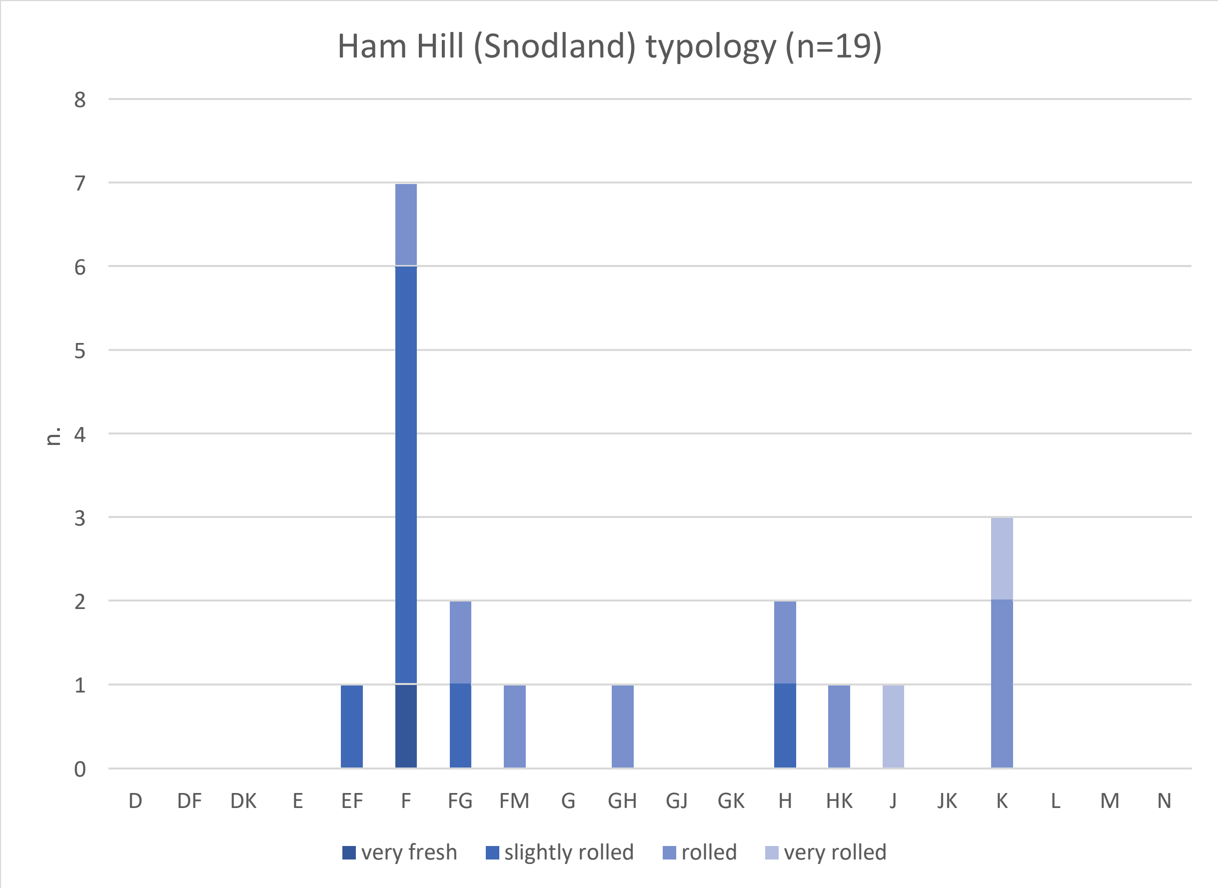
n=529	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.57	0.58	0.31	0.62	0.22
Median	0.56	0.57	0.29	0.58	0.13
Mode	0.50	0.50	0.25	0.50	0.50
St. Dev (+/-)	0.10	0.08	0.11	0.19	0.17
Max.	1.05	1.03	0.77	1.79	0.95
Min.	0.34	0.38	0.06	0.27	0.05
CV	18.30	14.14	37.03	30.11	79.16


Butt working.
63
222
244
Fully worked
Partially worked
Unworked


Blank type.
25
262
242
Indeterminate
Pebble or cobble
Flake

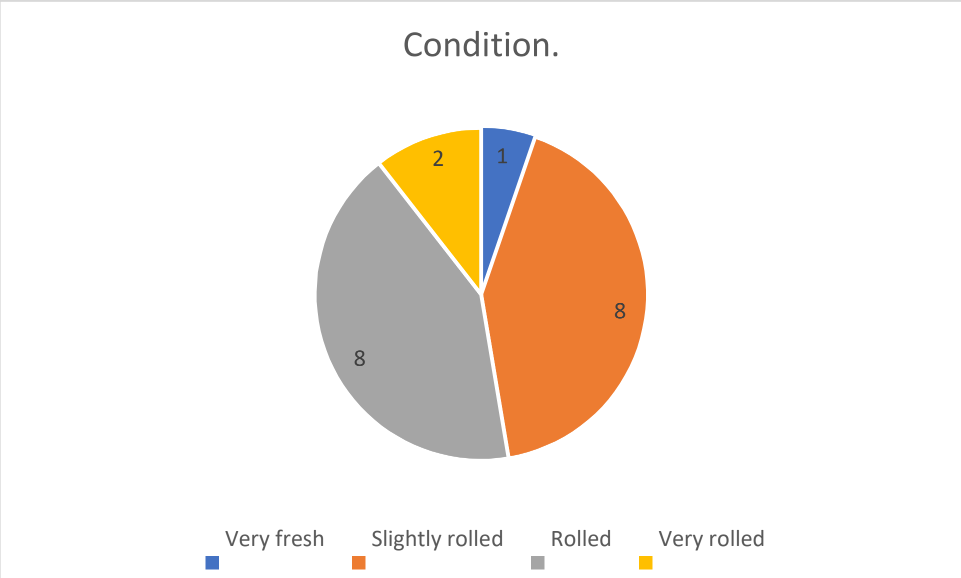

Condition.
Very fresh
Slightly rolled
Rolled
Very rolled

Ham Hill.

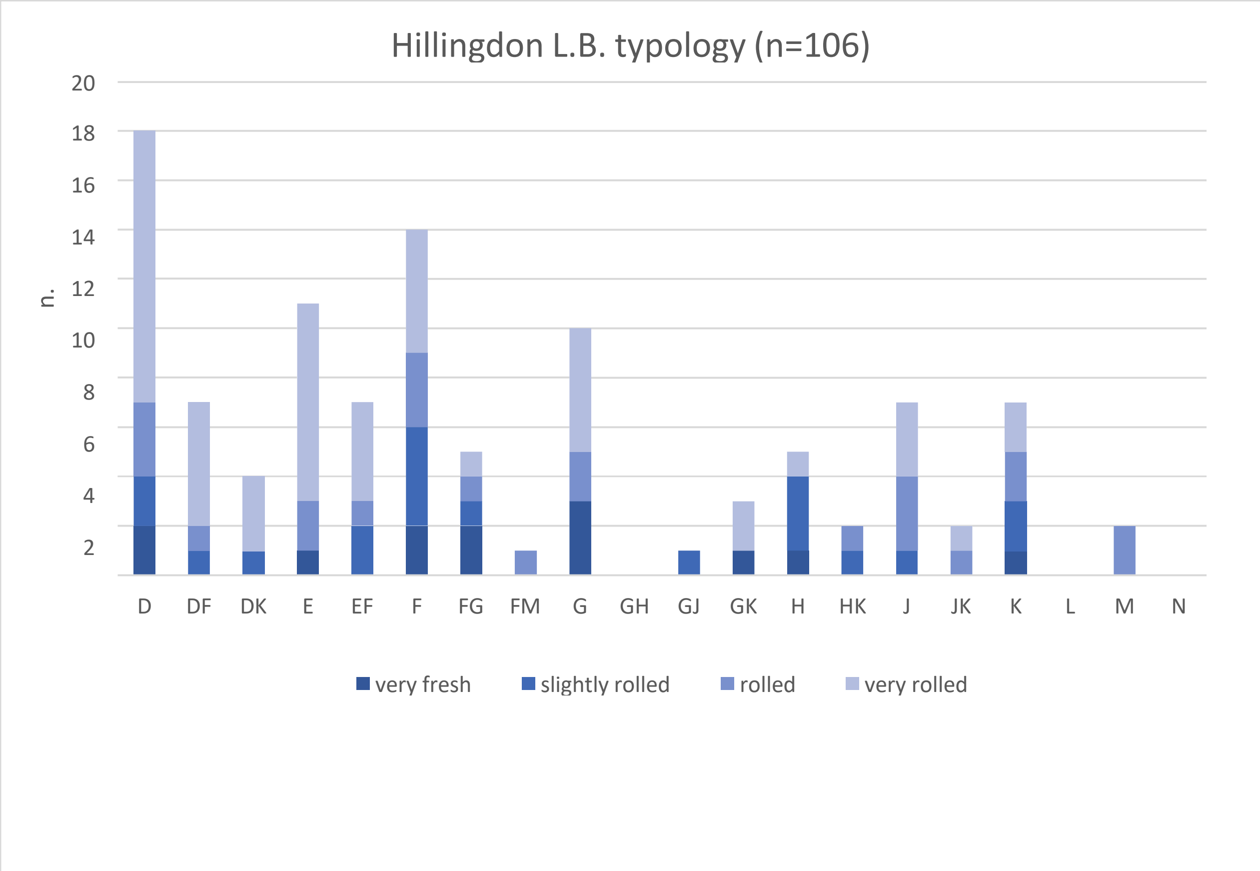


n=19	L (mm)	B (mm)	T (mm)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	133	76	39	46	48	71	15	32
Median	136	73	40	34	45	67	15	35
Mode	120	81	45	32	50	55	14	42
St. Dev (+/-)	42	18	9	25	18	17	4	10
Max.	212	113	53	108	90	101	22	49
Min.	72	50	18	13	20	48	9	16
CV	31.60	23.85	24.49	53.87	37.07	23.54	24.12	30.64

n=19	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.52	0.60	0.35	0.69	0.53
Median	0.52	0.59	0.33	0.64	0.46
Mode	N/A	N/A	N/A	N/A	N/A
St. Dev (+/-)	0.14	0.13	0.14	0.25	0.19
Max.	0.96	0.85	0.64	1.27	0.87
Min.	0.29	0.32	0.08	0.42	0.21
CV	27.40	20.88	40.35	35.82	36.60

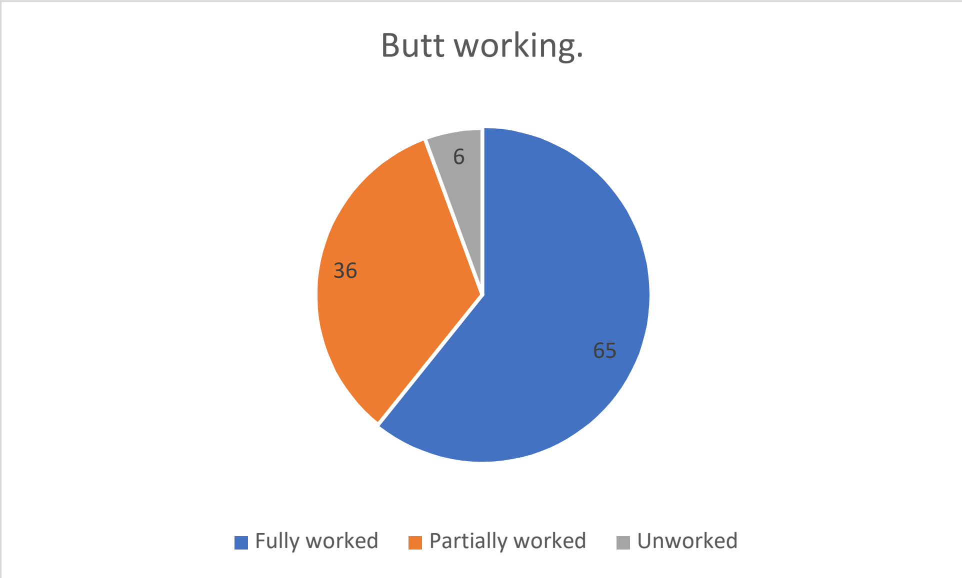

Condition.
1
8
8
2
Very fresh
Slightly rolled
Rolled
Very rolled

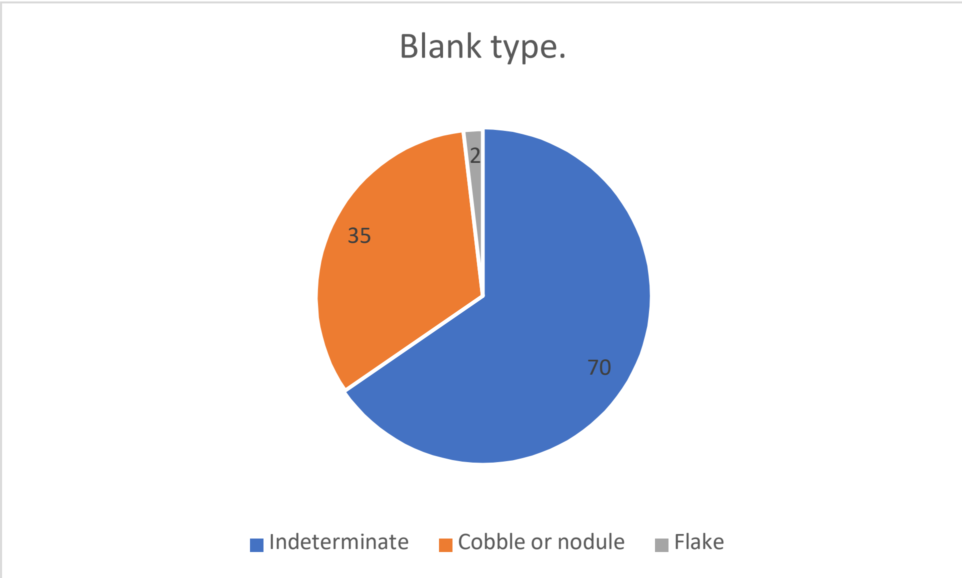
Hillingdon L.B.

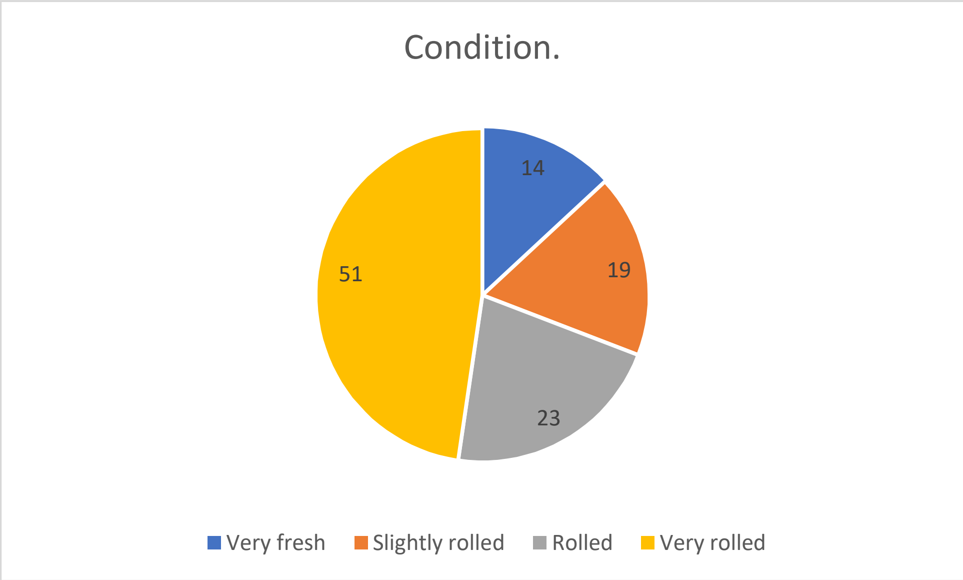


n=107	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	119	73	65	36	250	38	44	65	17	30
Median	114	70	64	37	157	36	41	61	16	31
Mode	113	70	61	37	N/A	40	33	58	18	36
St. Dev (+/-)	31	16	16	8	158	17	16	15	6	8
Max.	228	119	116	55	470	96	105	113	37	49
Min.	60	41	33	15	127	6	20	36	7	11
CV	25.81	21.78	24.87	22.94	63.09	45.29	37.25	23.78	33.84	25.77

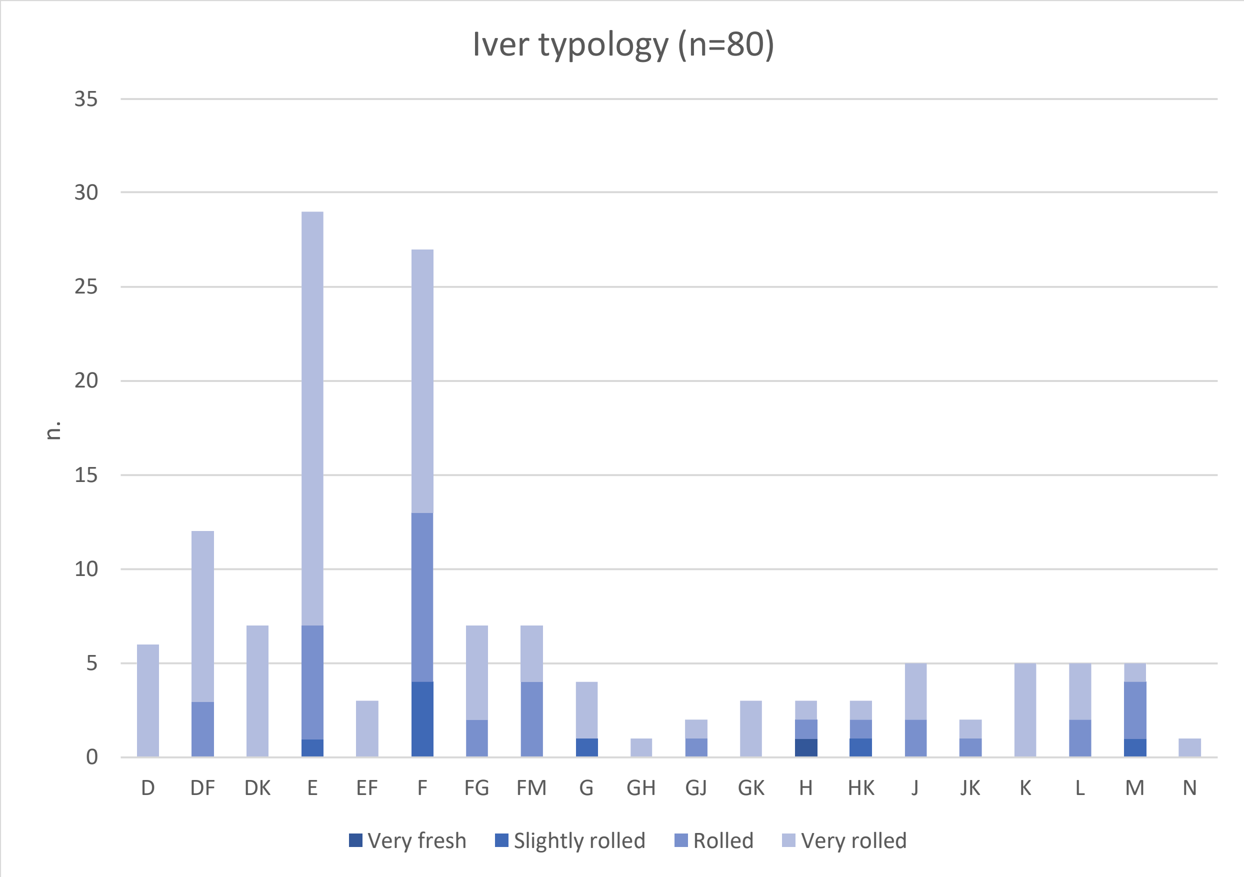
n=107	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.51	0.62	0.31	0.67	0.56
Median	0.49	0.61	0.31	0.65	0.52
Mode	0.50	0.50	0.38	0.75	0.50
St. Dev (+/-)	0.11	0.10	0.10	0.17	0.19
Max.	0.96	0.86	0.60	1.32	1.08
Min.	0.29	0.46	0.06	0.39	0.24
CV	21.67	15.76	32.46	25.71	34.19


Butt working.
6
36
65
Fully worked
Partially worked
Unworked


Blank type.
2
35
70
Indeterminate
Cobble or nodule
Flake

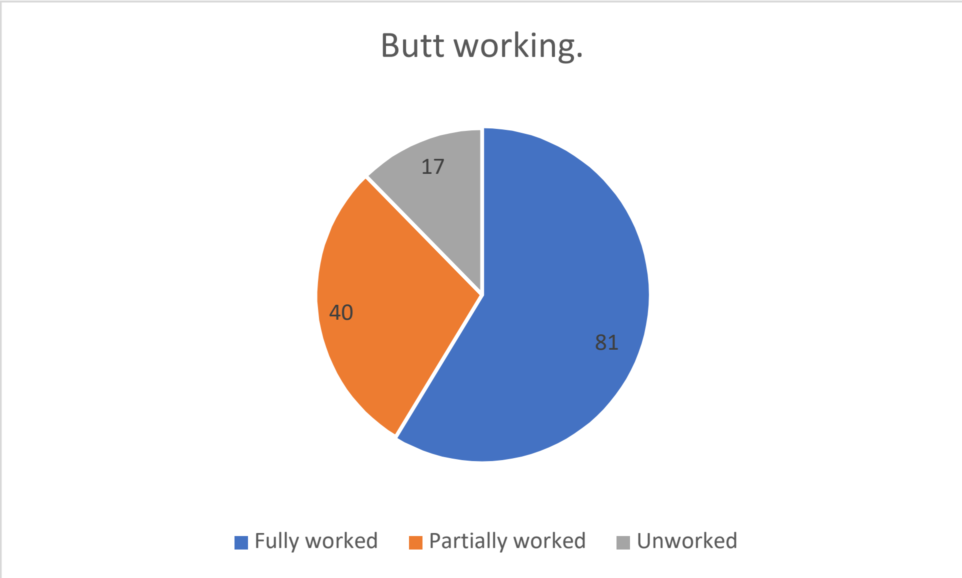

Condition.
14
19
23
51
Very fresh
Slightly rolled
Rolled
Very rolled

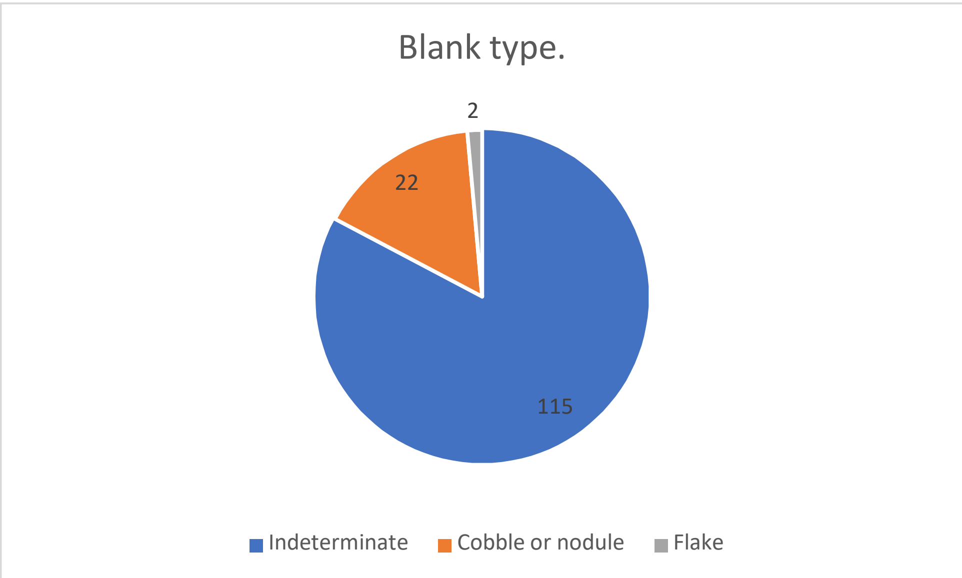
Iver.

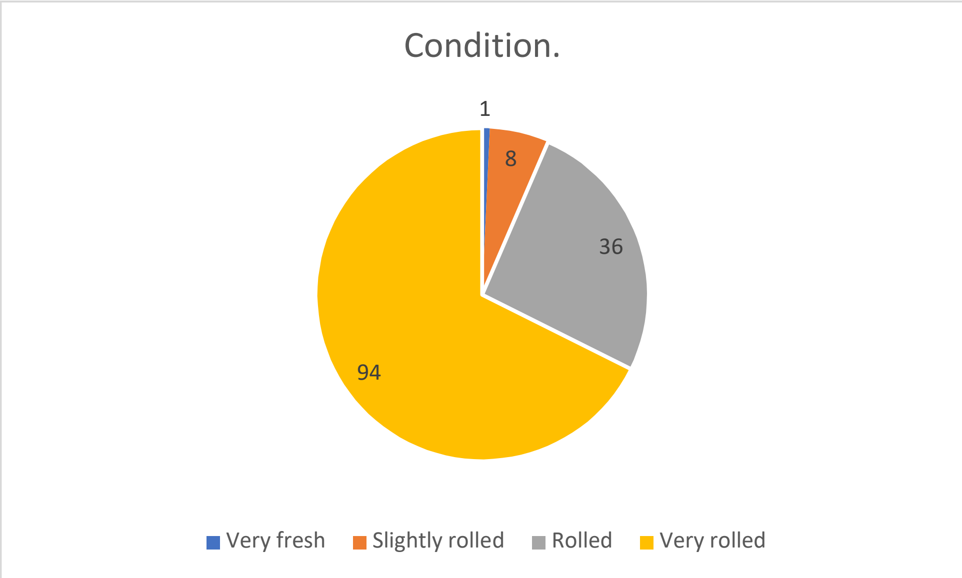


n=139	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	108	67	59	35	274	35	37	61	16	30
Median	107	66	59	35	234	32	35	59	15	30
Mode	119	67	60	45	161	16	31	56	14	26
St. Dev (+/-)	29	15	14	9	197	16	13	14	5	8
Max.	207	120	116	59	1477	106	100	116	39	56
Min.	53	32	30	18	45	7	18	31	6	15
CV	26.69	21.64	23.86	25.09	71.80	44.42	35.99	22.85	31.83	27.80

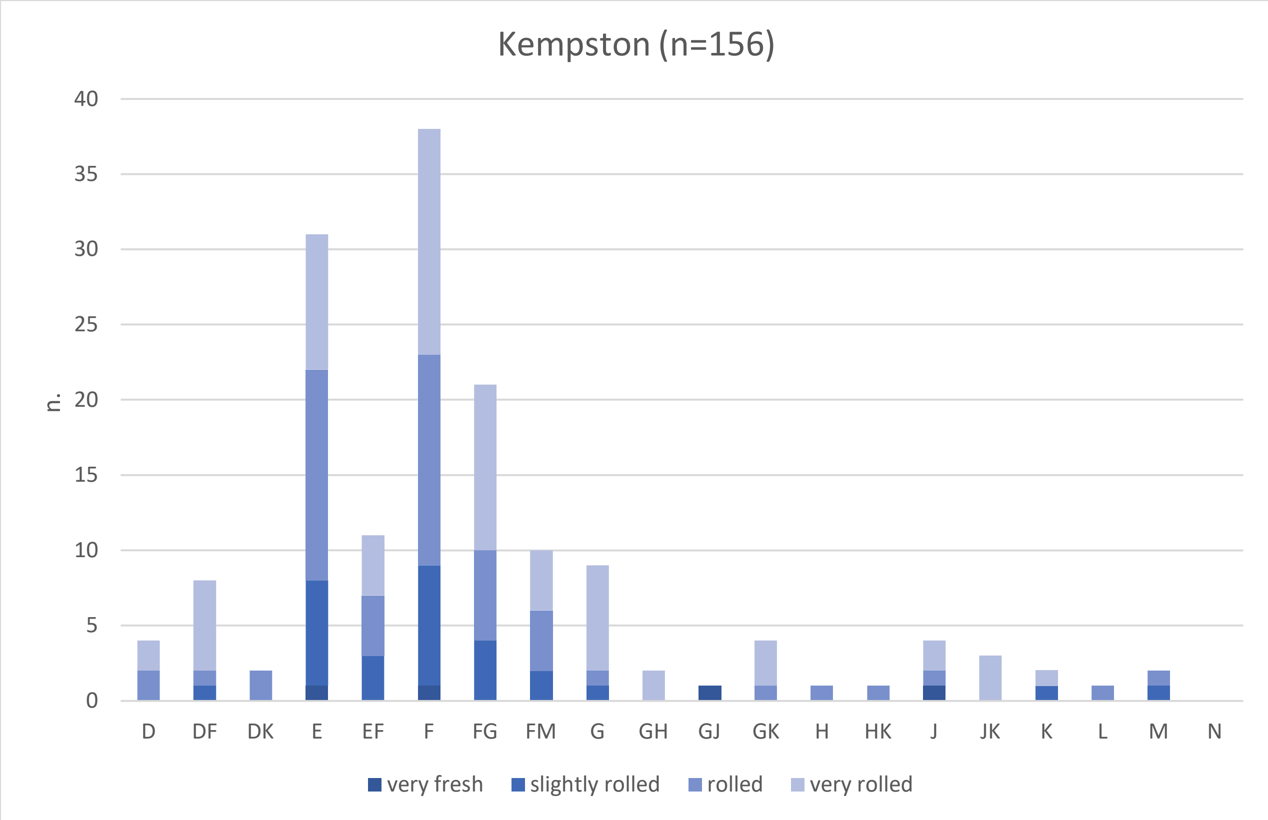
n=139	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.53	0.64	0.32	0.62	0.56
Median	0.51	0.62	0.31	0.60	0.54
Mode	0.35	0.62	0.38	0.56	0.50
St. Dev (+/-)	0.12	0.11	0.11	0.17	0.18
Max.	1.28	1.04	0.65	1.23	1.16
Min.	0.26	0.29	0.07	0.30	0.16
CV	23.21	17.65	34.74	27.93	32.67


Butt working.
17
40
81
Fully worked
Partially worked
Unworked


Blank type.
2
22
115
Indeterminate
Cobble or nodule
Flake

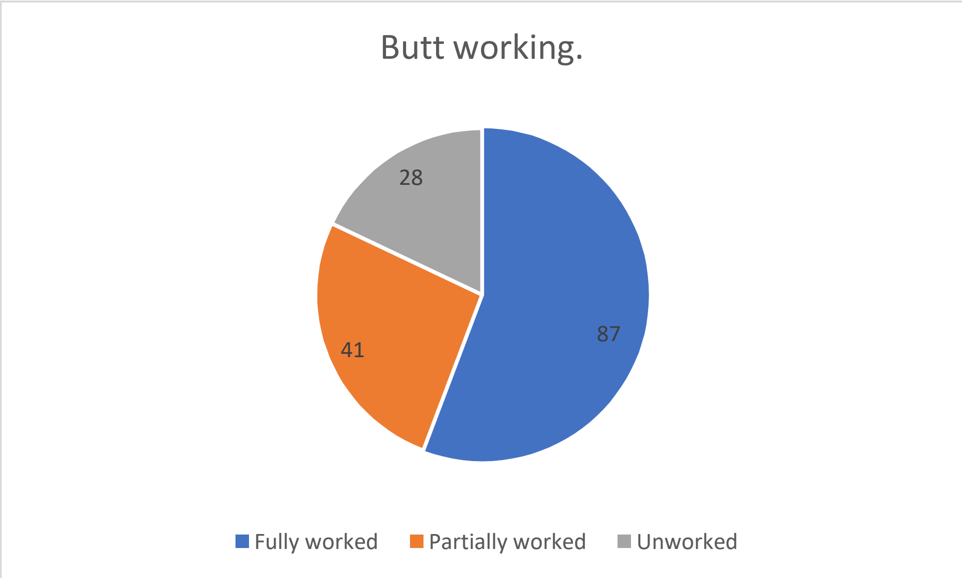

Condition.
1
8
36
94
Very fresh
Slightly rolled
Rolled
Very rolled

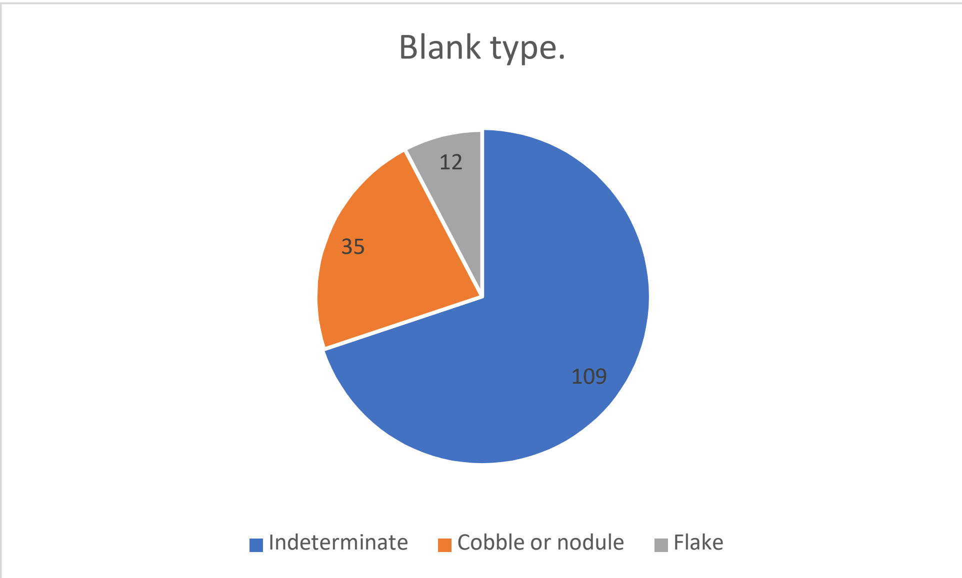
Kempston.

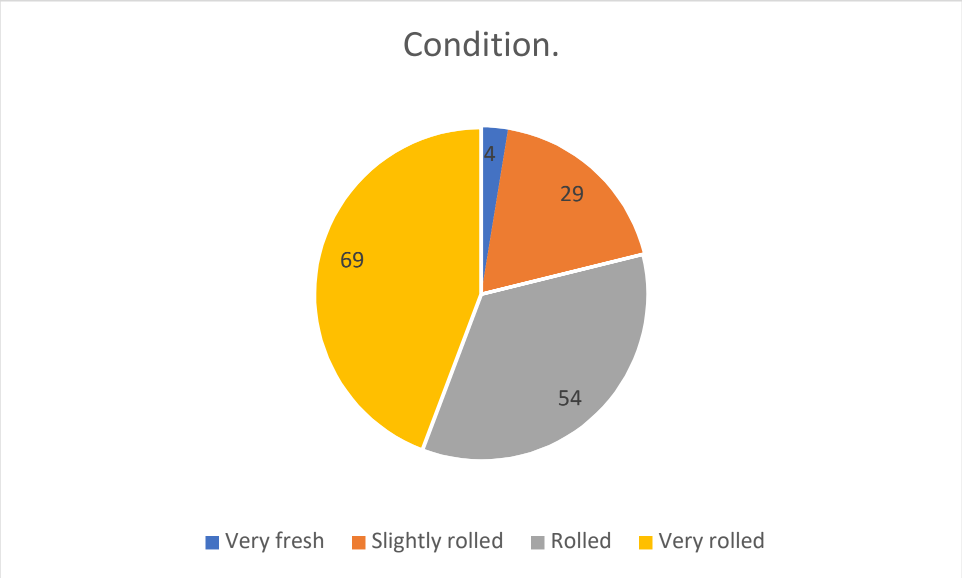


n=156	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	102	66	59	34	239	34	38	59	15	29
Median	99	65	58	33	196	32	36	59	14	29
Mode	88	65	54	26	169	27	36	63	14	35
St. Dev (+/-)	23	13	13	8	138	12	12	13	5	8
Max.	180	108	97	59	663	90	88	99	38	51
Min.	66	41	37	17	53	8	19	19	5	13
CV	22.15	20.19	22.05	24.20	57.99	36.61	30.58	22.61	30.98	26.26

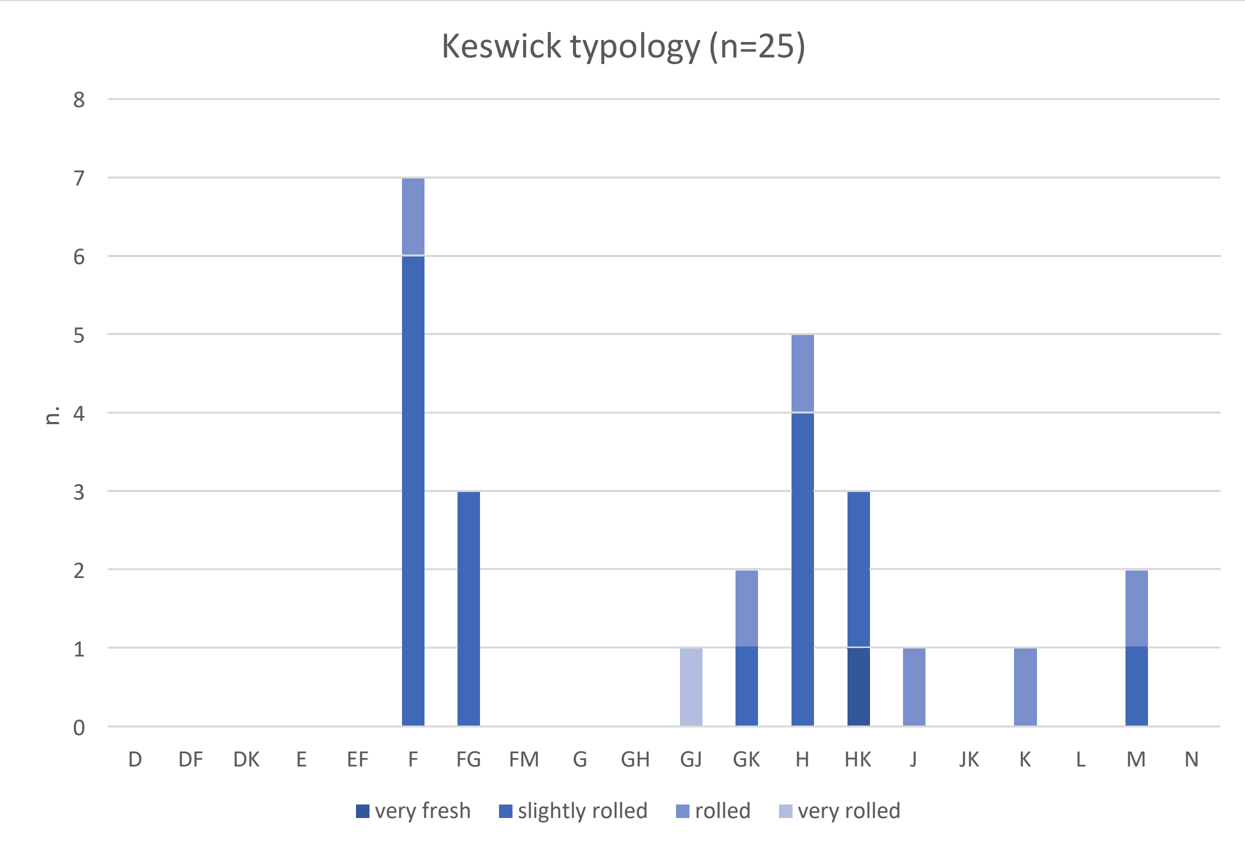
n=156	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.52	0.66	0.33	0.66	0.54
Median	0.51	0.64	0.32	0.63	0.50
Mode	0.50	0.67	0.22	0.54	0.50
St. Dev (+/-)	0.11	0.10	0.10	0.17	0.20
Max.	0.82	0.92	0.72	1.39	1.60
Min.	0.29	0.46	0.10	0.38	0.24
CV	20.10	15.95	30.67	25.88	37.14


Butt working.
28
41
87
Fully worked
Partially worked
Unworked


Blank type.
12
35
109
Indeterminate
Cobble or nodule
Flake

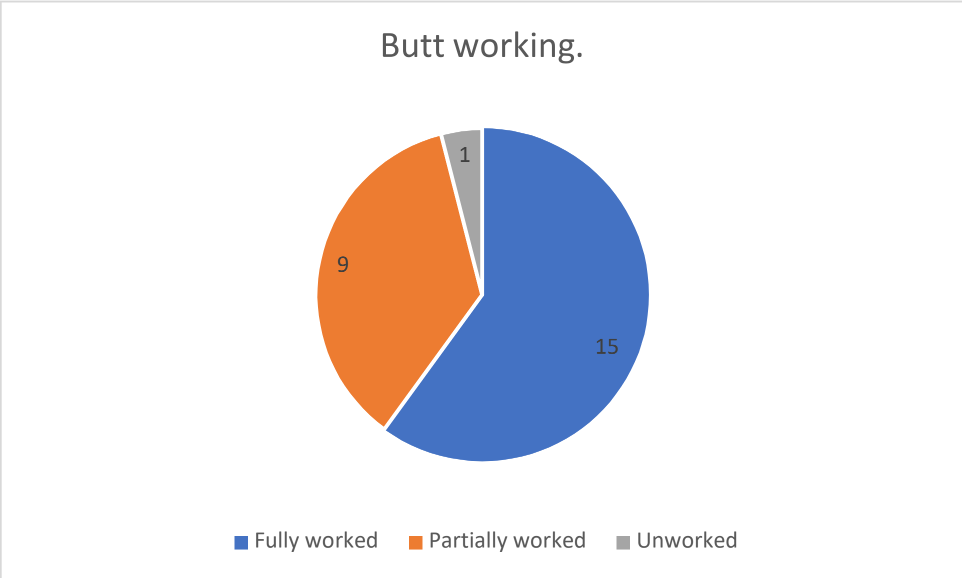

Condition.
4
29
54
69
Very fresh
Slightly rolled
Rolled
Very rolled

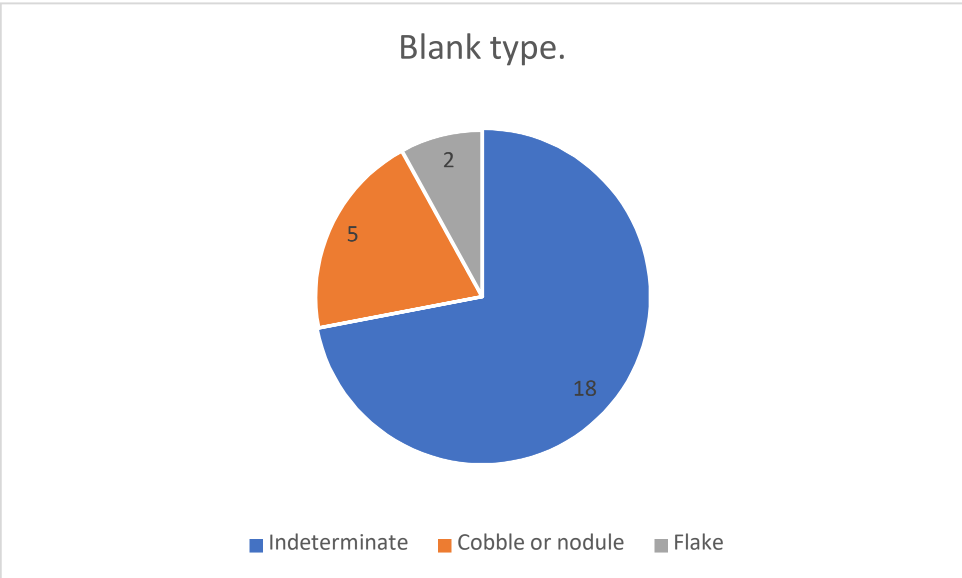
Keswick.

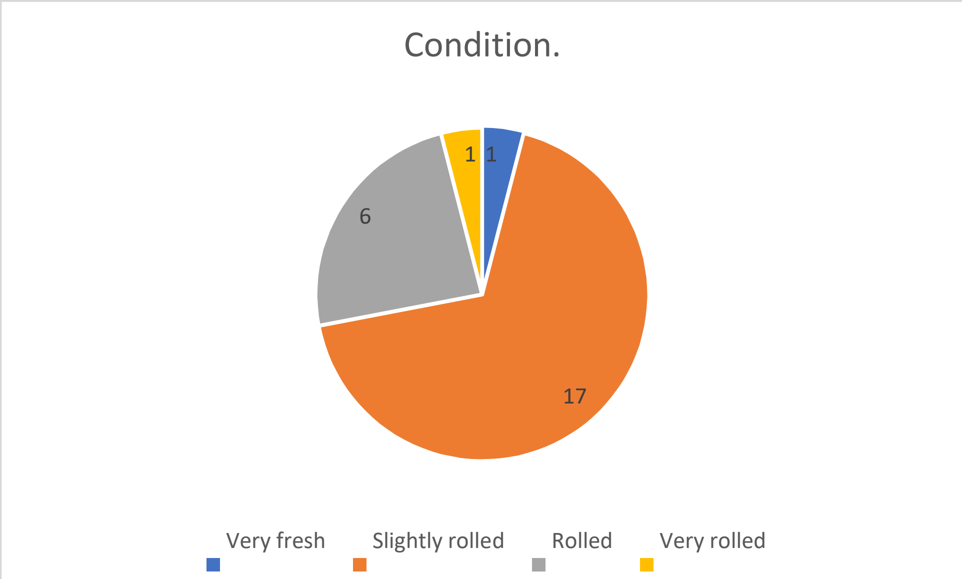


n=25	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	152	90	81	40	N/A	52	58	81	17	36
Median	148	87	84	39	N/A	51	56	77	16	37
Mode	156	103	72	43	N/A	58	68	71	15	31
St. Dev (+/-)	36	17	20	7	N/A	21	19	15	3	9
Max.	245	125	125	54	N/A	111	99	113	22	56
Min.	98	66	37	28	N/A	21	24	61	9	19
CV	23.94	18.40	24.86	18.04	N/A	40.46	33.44	18.36	19.86	25.07

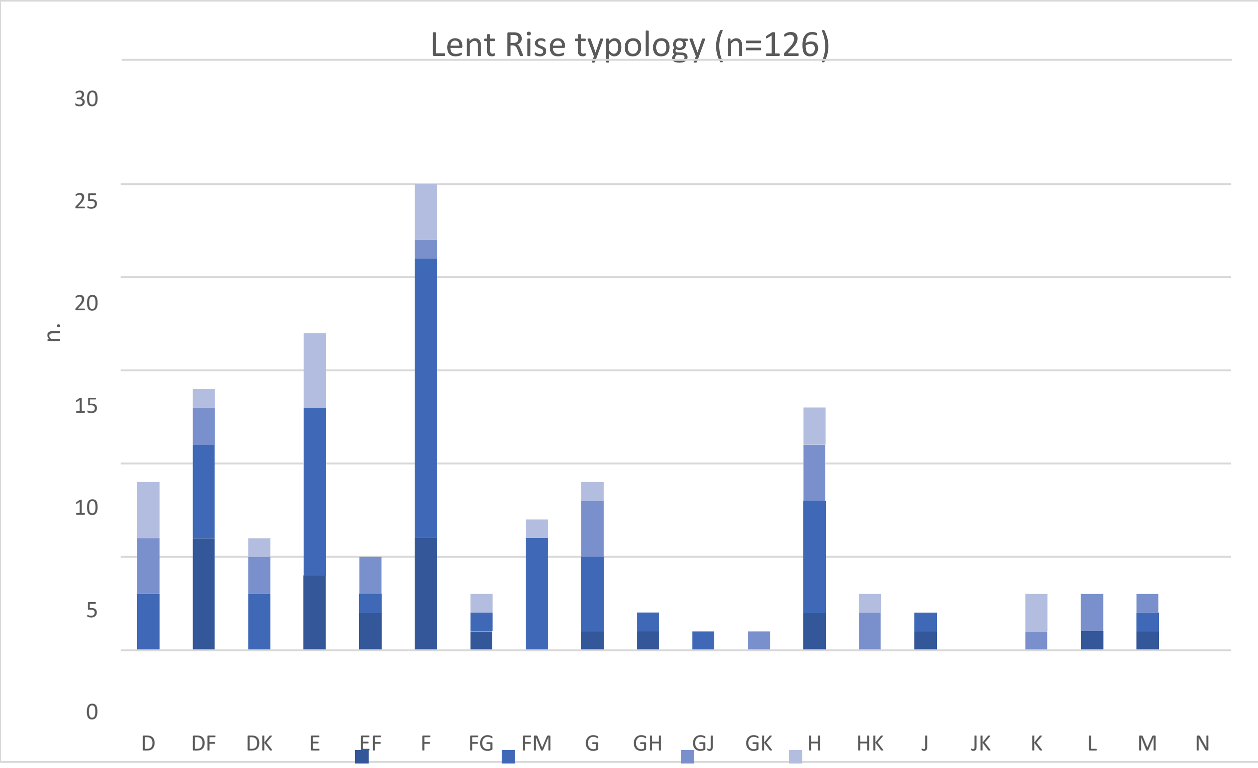
n=25	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.45	0.61	0.35	0.72	0.48
Median	0.43	0.61	0.29	0.65	0.45
Mode	N/A	N/A	N/A	N/A	0.41
St. Dev (+/-)	0.08	0.09	0.13	0.23	0.13
Max.	0.59	0.77	0.60	1.36	0.89
Min.	0.34	0.45	0.14	0.36	0.33
CV	16.90	15.52	37.45	32.11	26.53


Butt working.
1
9
15
Fully worked
Partially worked
Unworked


Blank type.
2
5
18
Indeterminate
Cobble or nodule
Flake

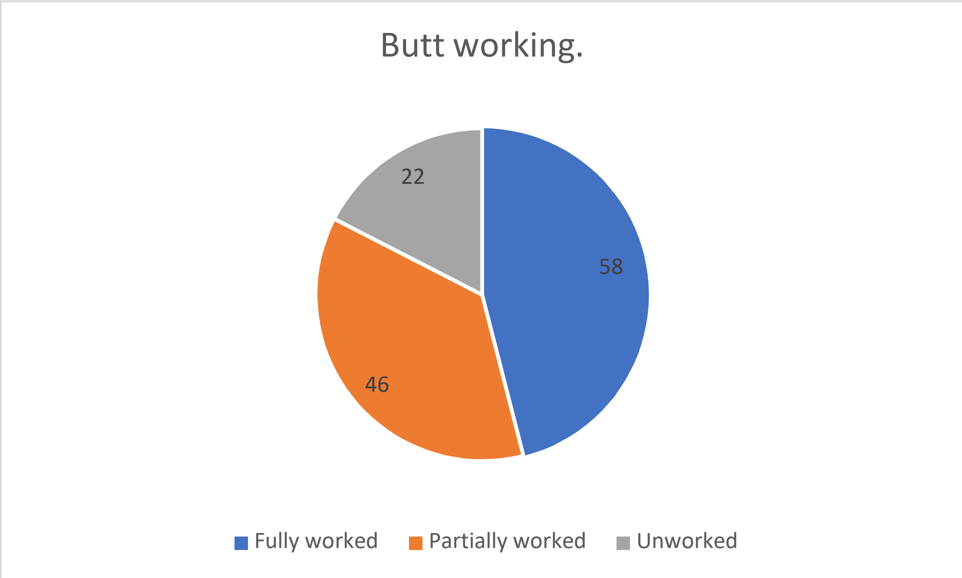

Condition.
1
1
6
17
Very fresh
Slightly rolled
Rolled
Very rolled

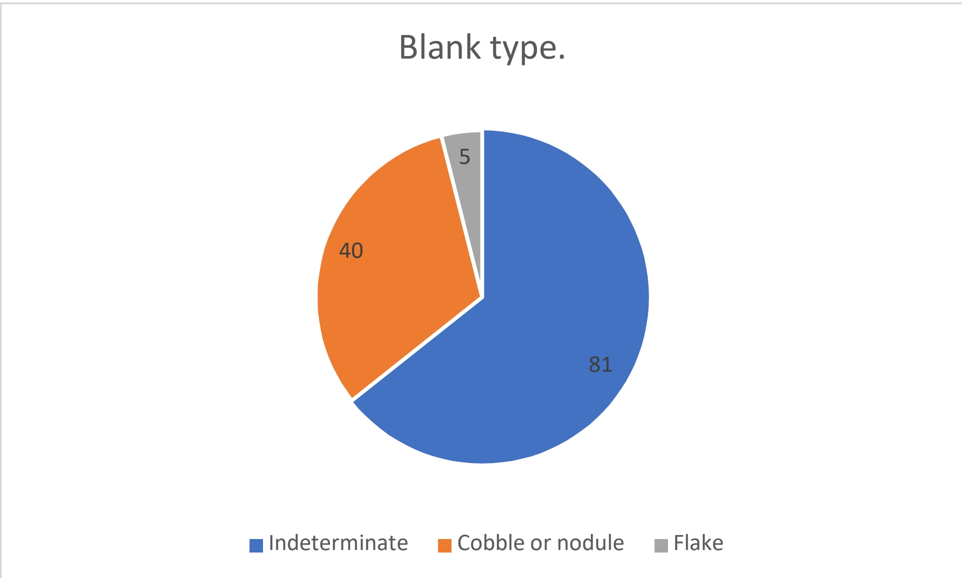
Lent Rise.

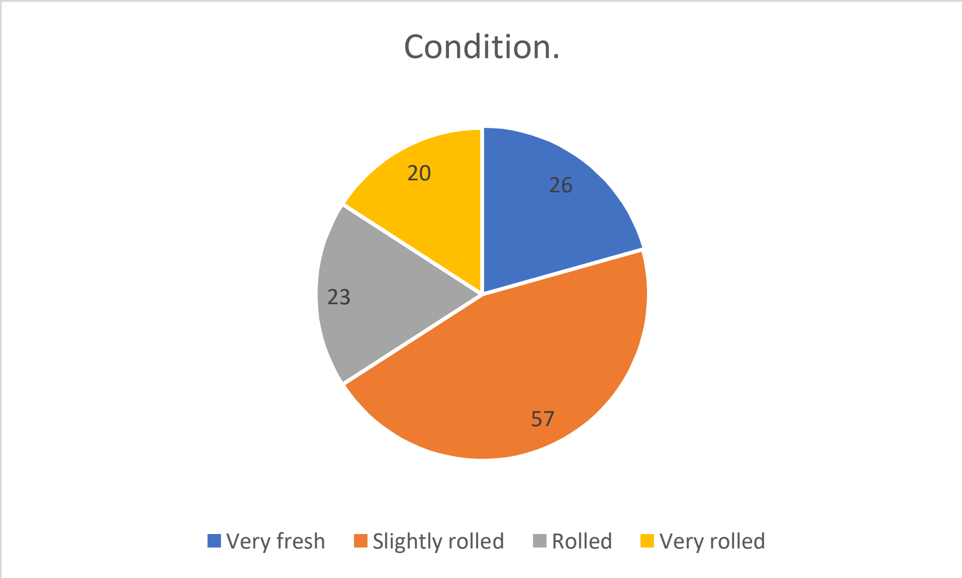


n=126	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	111	67	60	37	274	38	39	59	16	31
Median	112	69	60	37	257	37	37	58	15	30
Mode	107	78	69	30	289	37	35	46	15	27
St. Dev (+/-)	23	14	14	9	150	17	14	13	5	8
Max.	172	112	92	62	841	93	105	94	31	53
Min.	66	35	29	17	52	1	16	34	6	14
CV	20.68	21.04	22.87	24.14	54.82	43.47	35.98	22.64	31.66	27.27

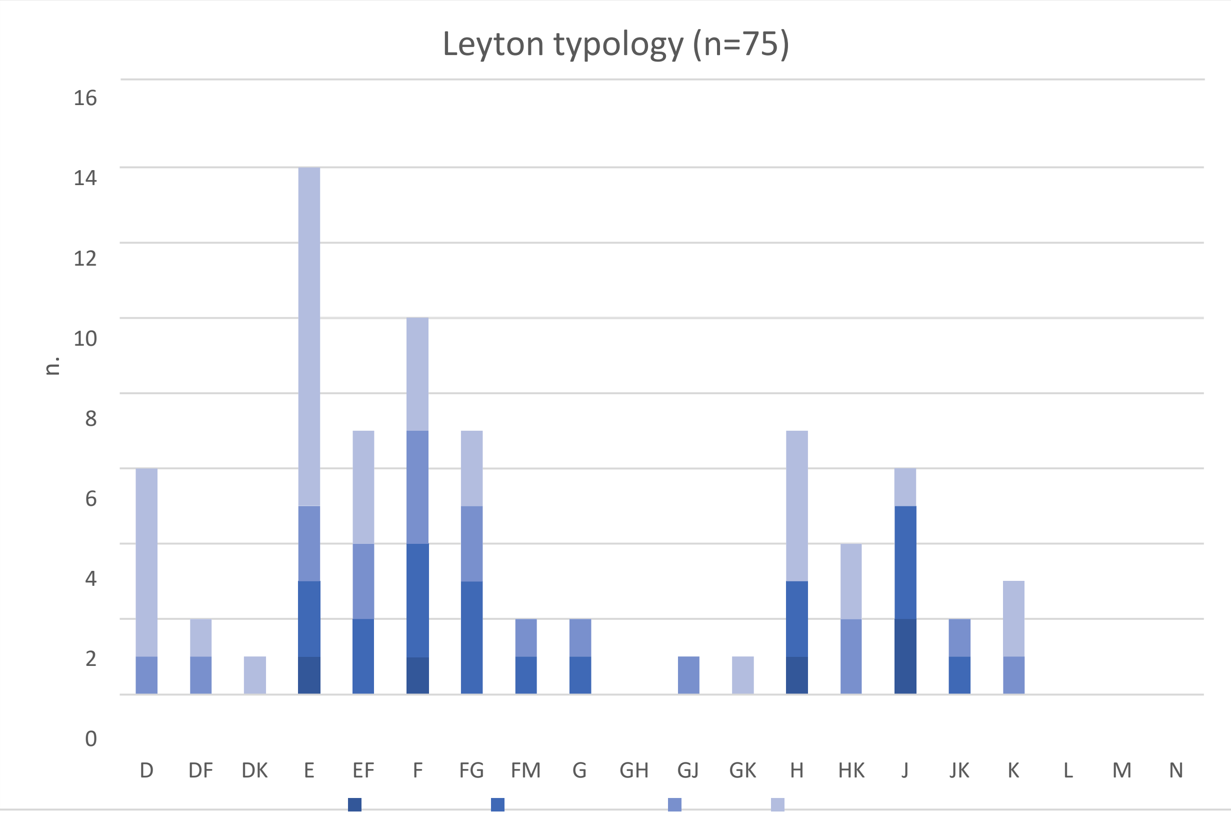
n=126	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.55	0.62	0.34	0.68	0.54
Median	0.55	0.60	0.34	0.61	0.52
Mode	0.56	0.63	0.31	0.60	0.45
St. Dev (+/-)	0.12	0.11	0.14	0.23	0.18
Max.	0.90	1.15	0.71	1.69	1.19
Min.	0.29	0.39	0.00	0.30	0.21
CV	21.90	18.12	39.33	33.53	34.39


Butt working.
22
58
46
Fully worked
Partially worked
Unworked


Blank type.
5
40
81
Indeterminate
Cobble or nodule
Flake

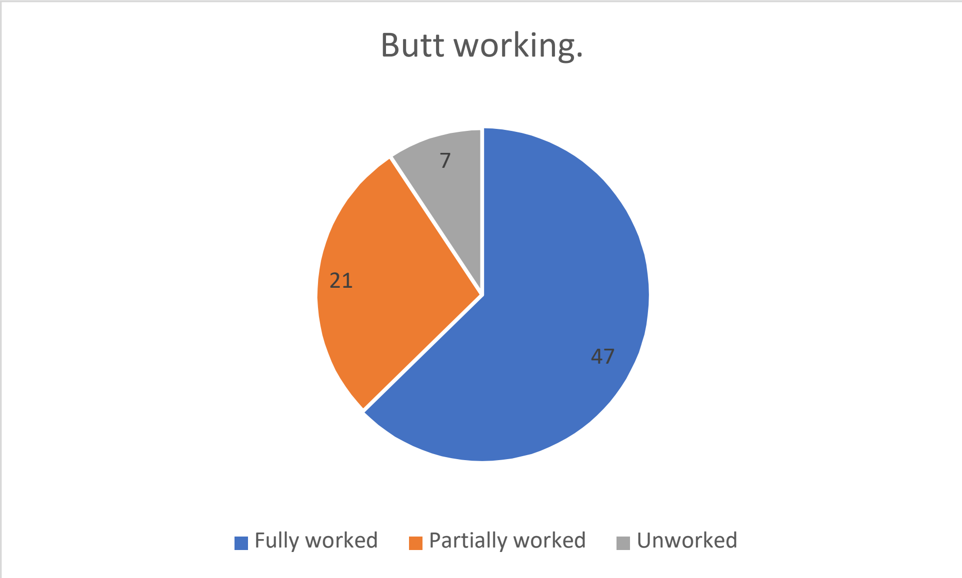

Condition.
26
57
23
20
Very fresh
Slightly rolled
Rolled
Very rolled

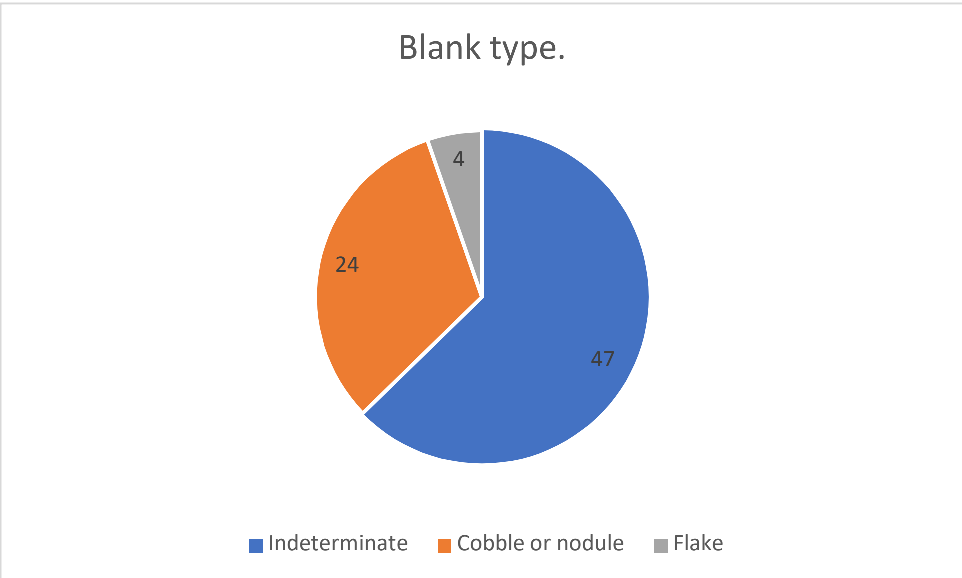
Leyton.

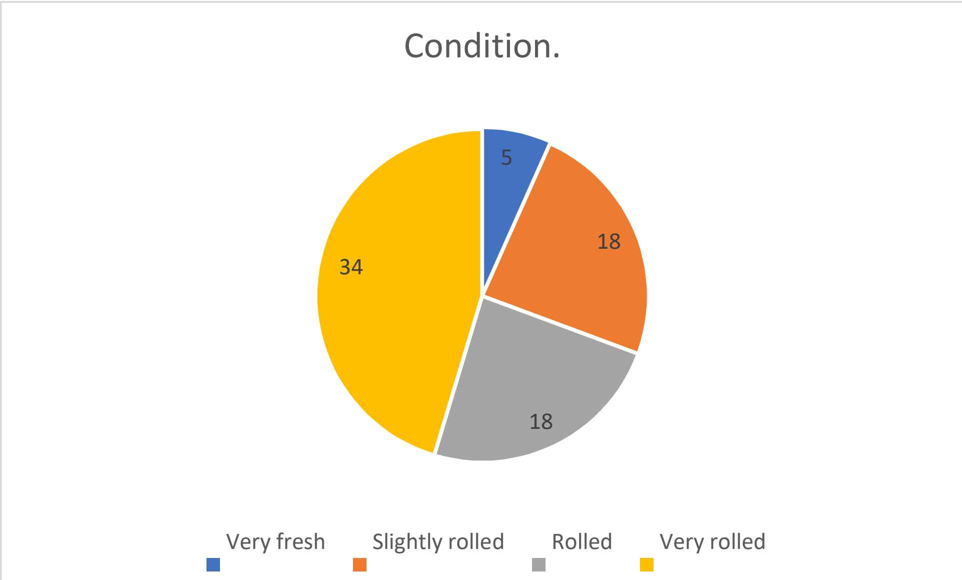


n=75	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	110	70	63	35	297	34	41	63	16	29
Median	107	69	62	36	240	32	39	62	15	29
Mode	100	70	49	40	N/A	24	25	57	16	28
St. Dev (+/-)	27	15	14	7	182	14	13	13	4	7
Max.	175	106	92	54	769	88	77	96	26	49
Min.	61	40	37	21	59	13	19	32	8	13
CV	24.69	21.52	22.95	20.99	61	40.49	32.67	21.14	27.05	25.22

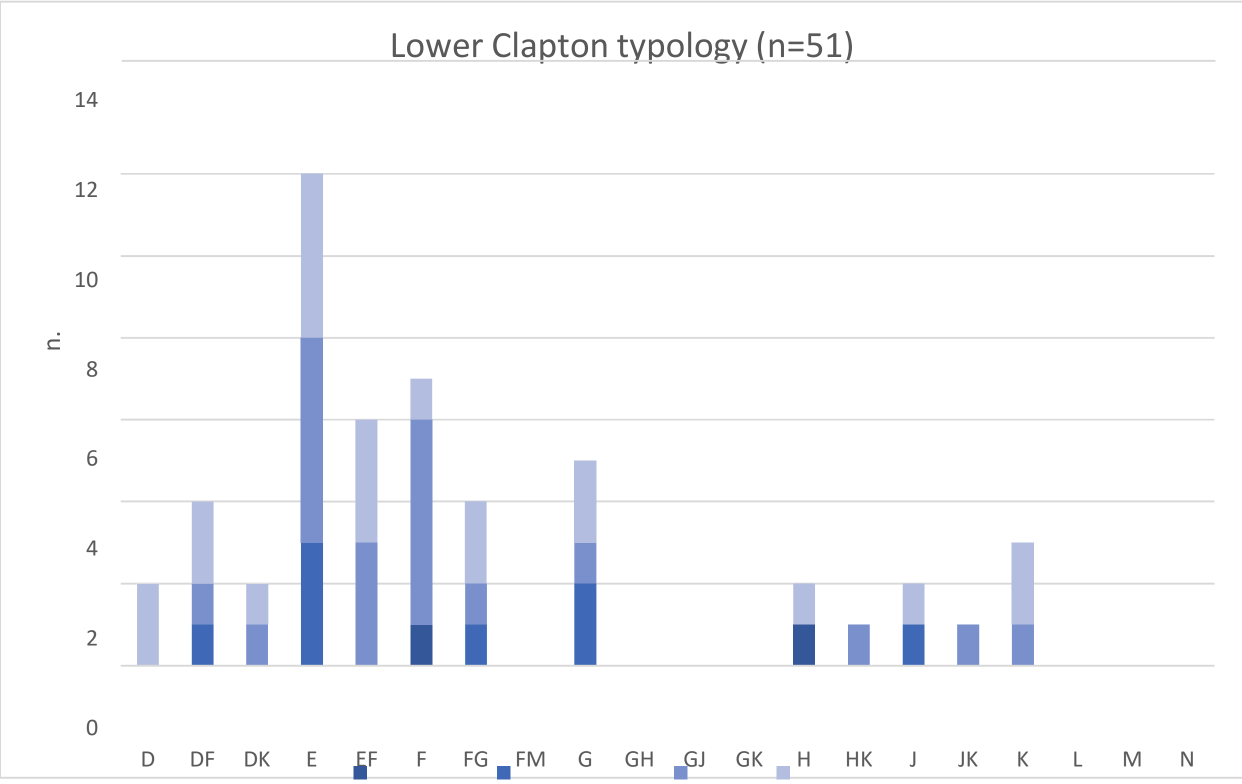
n=75	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.51	0.65	0.32	0.65	0.58
Median	0.52	0.64	0.30	0.63	0.55
Mode	0.50	0.60	0.40	0.52	0.50
St. Dev (+/-)	0.12	0.12	0.11	0.18	0.18
Max.	1.02	0.98	0.73	1.13	1.16
Min.	0.30	0.41	0.13	0.35	0.24
CV	22.38	17.79	35.55	27.53	32.04


Butt working.
7
21
47
Fully worked
Partially worked
Unworked


Blank type.
4
24
47
Indeterminate
Cobble or nodule
Flake

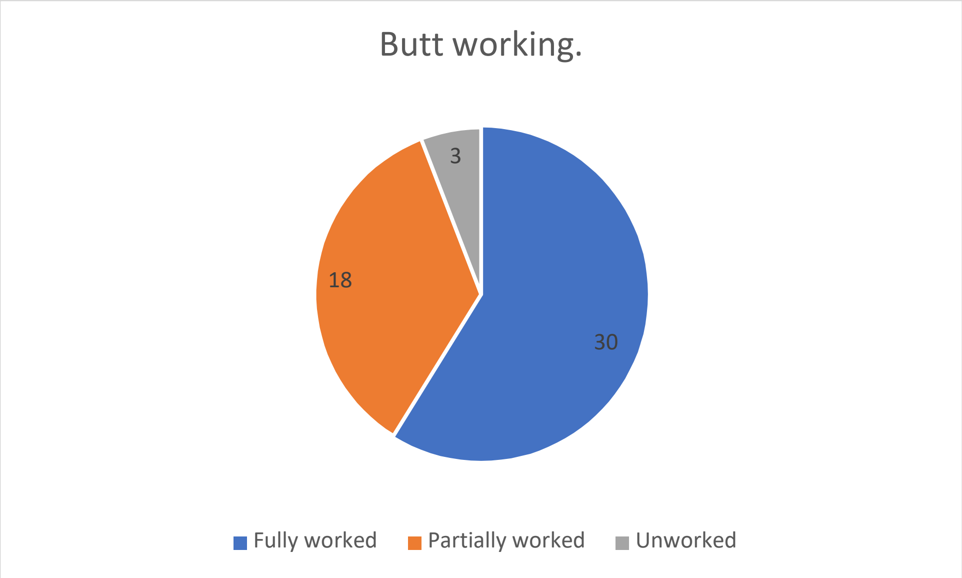

Condition.
5
18
18
34
Very fresh
Slightly rolled
Rolled
Very rolled

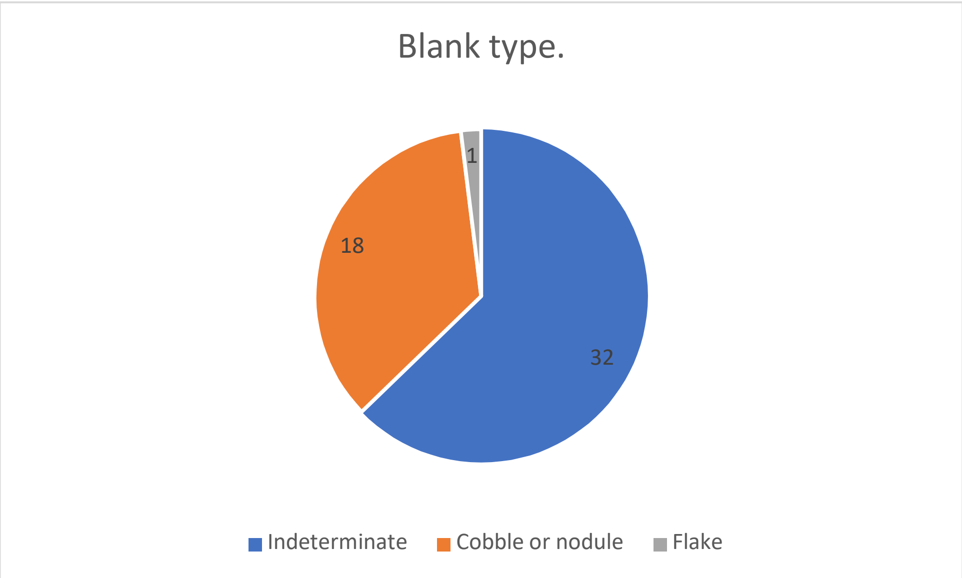
Lower Clapton.

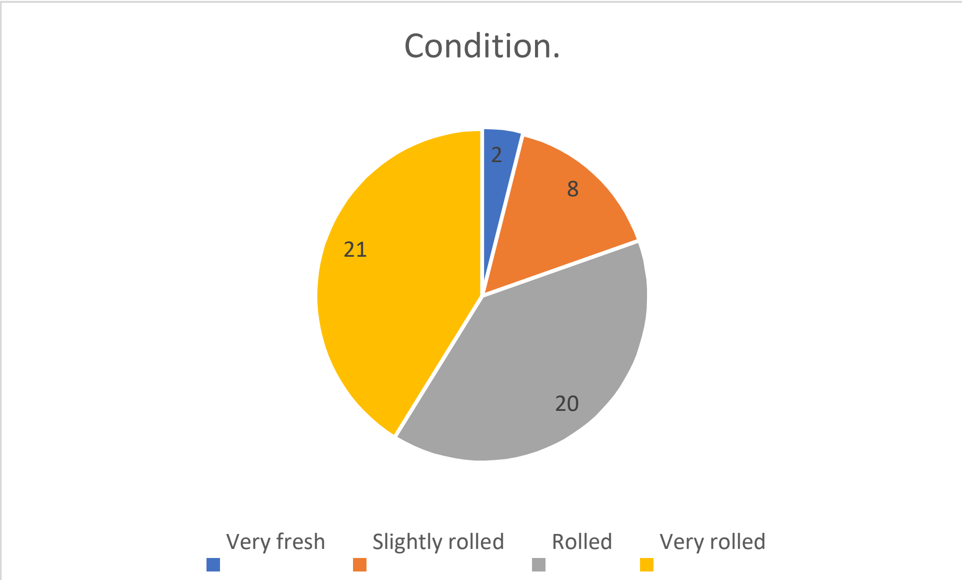


n=51	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	102	64	55	34	N/A	34	36	58	14	29
Median	98	62	53	35	N/A	33	35	56	13	28
Mode	79	52	48	39	N/A	17	36	55	15	22
St. Dev (+/-)	22	13	15	8	N/A	17	13	12	3	8
Max.	181	107	105	48	N/A	113	96	89	23	45
Min.	69	44	29	17	N/A	5	17	37	8	12
CV	21.52	20.80	26.45	23.84	N/A	50.76	35.84	19.79	24.27	26.57

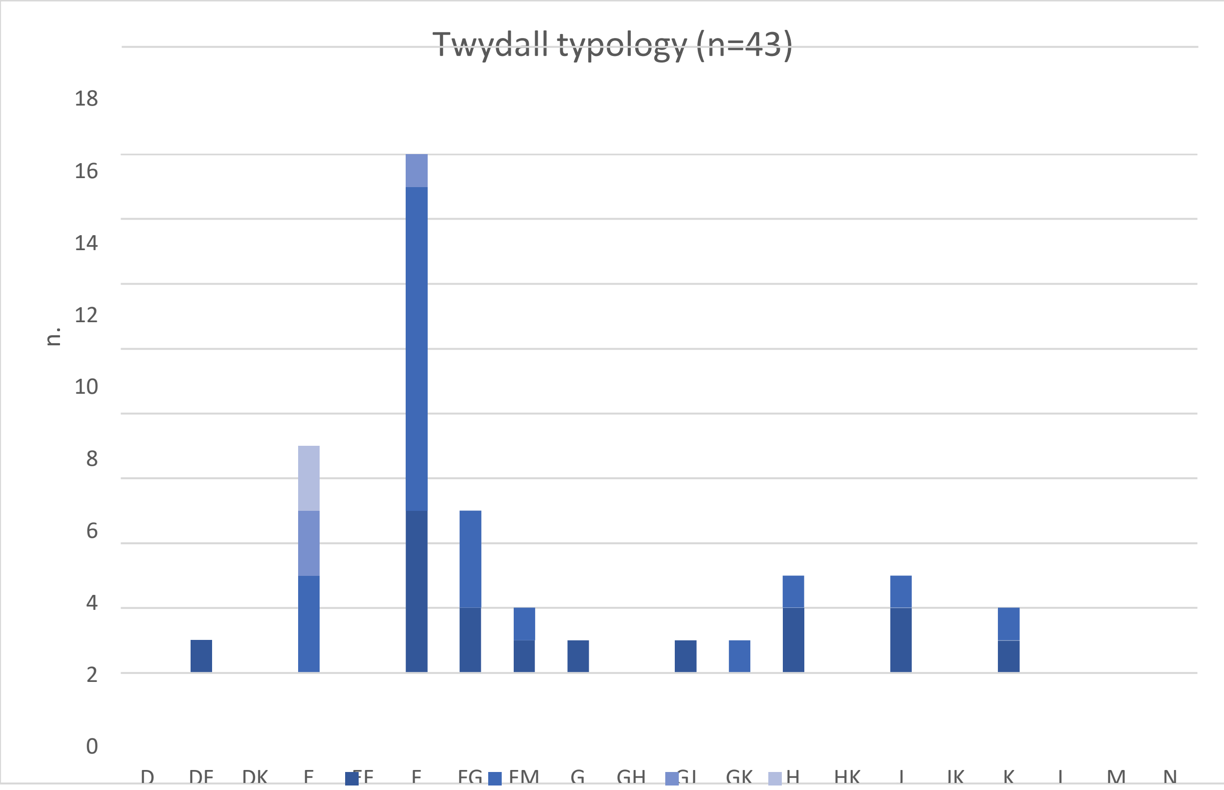
n=51	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.55	0.63	0.33	0.63	0.51
Median	0.53	0.62	0.34	0.59	0.48
Mode	0.49	0.62	0.35	0.93	0.60
St. Dev (+/-)	0.13	0.09	0.12	0.20	0.16
Max.	0.86	0.87	0.62	1.60	1.00
Min.	0.25	0.44	0.07	0.36	0.24
CV	24.04	14.22	37.68	32.04	31.36


Butt working.
3
18
30
Fully worked
Partially worked
Unworked


Blank type.
1
18
32
Indeterminate
Cobble or nodule
Flake

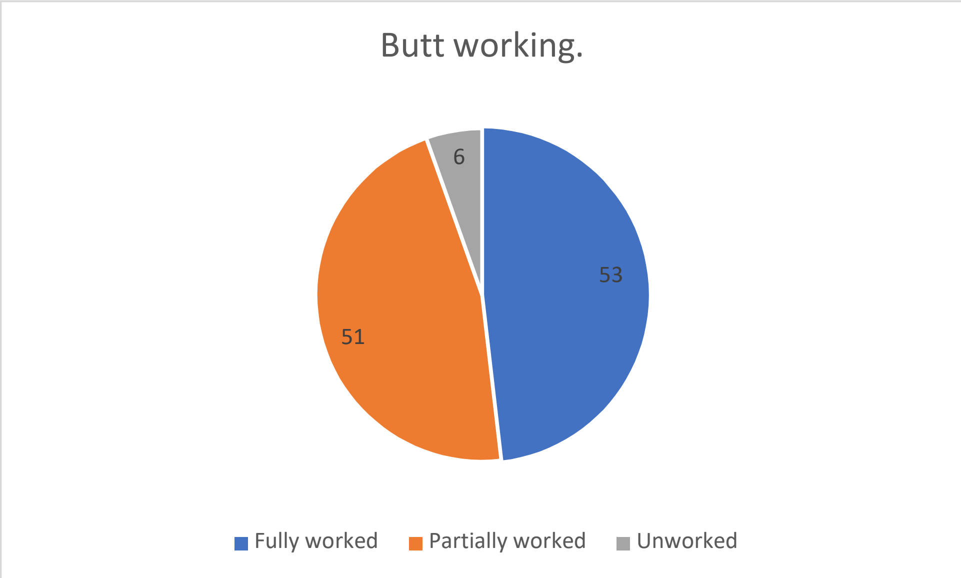

Condition.
2
8
20
21
Very fresh
Slightly rolled
Rolled
Very rolled

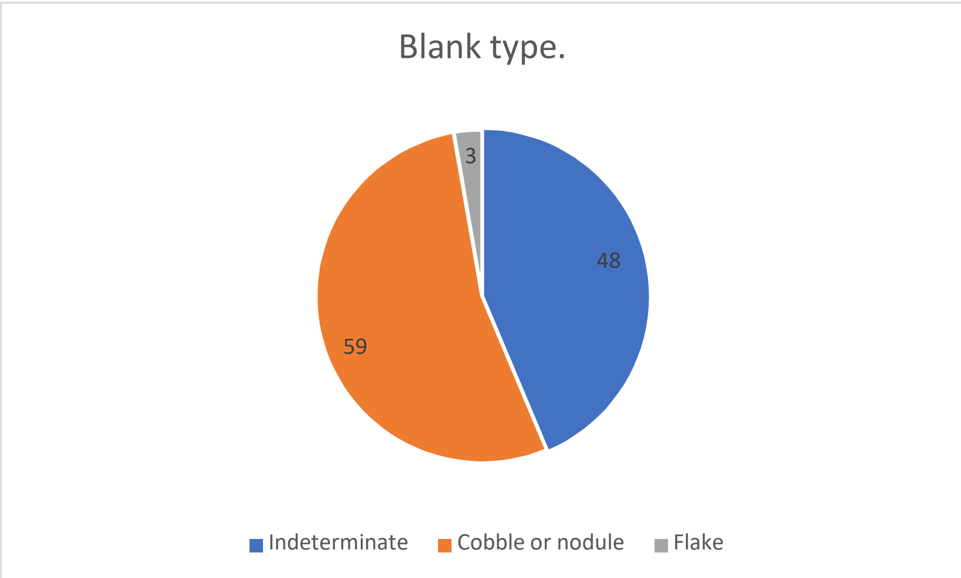
Ruscombe.

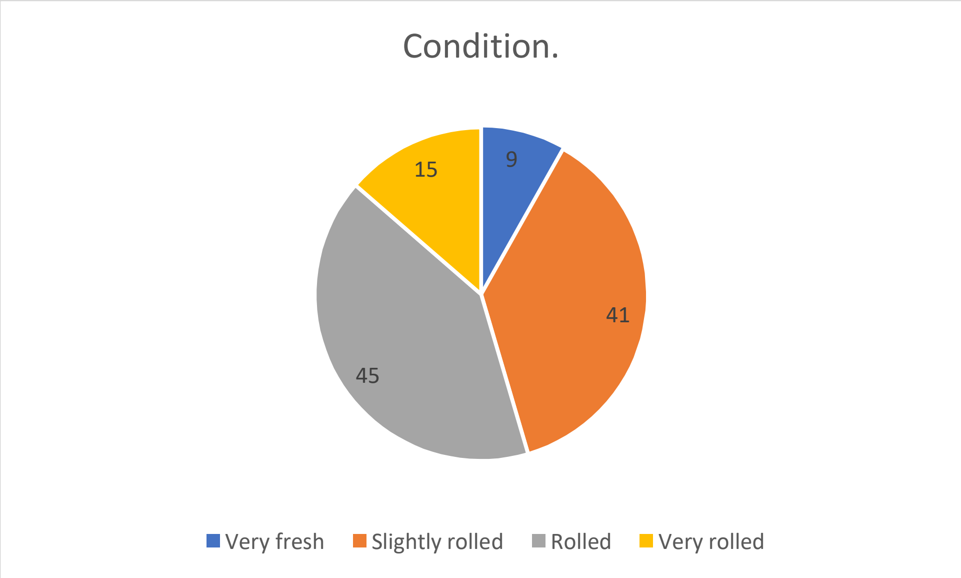


n=110	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	129	74	63	41	366	36	40	68	16	35
Median	124	73	62	40	324	34	39	66	16	36
Mode	113	73	54	39	336	30	45	65	15	28
St. Dev (+/-)	28	14	13	8	197	14	12	14	4	8
Max.	226	110	98	61	952	79	85	99	31	61
Min.	78	46	37	25	89	12	20	38	9	18
CV	21.89	18.31	20.43	20.11	53.91	39.98	29.40	20.57	25.52	22.11

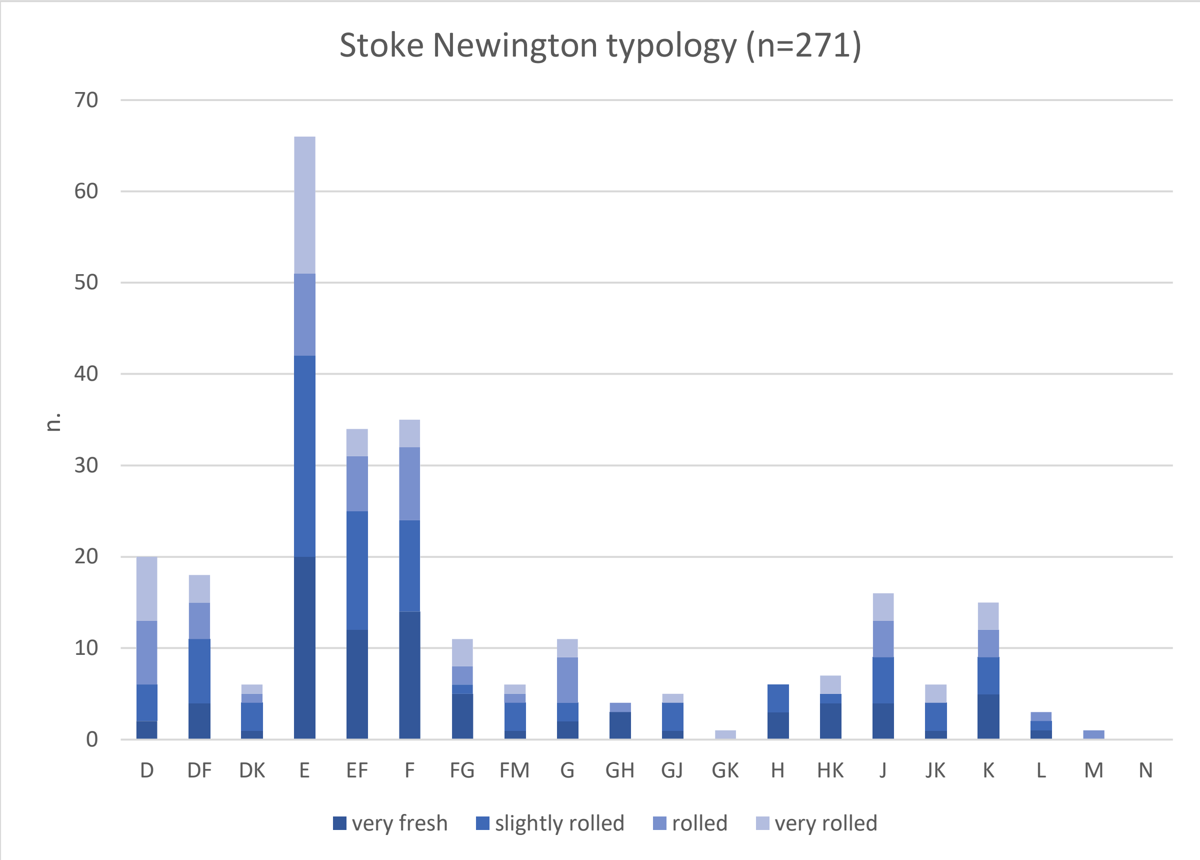
n=110	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.55	0.59	0.32	0.60	0.47
Median	0.54	0.58	0.31	0.57	0.45
Mode	0.50	0.55	0.31	0.63	0.50
St. Dev (+/-)	0.09	0.08	0.09	0.17	0.13
Max.	0.81	0.79	0.65	1.15	1.00
Min.	0.35	0.42	0.14	0.31	0.26
CV	15.87	12.87	29.53	28.43	27.35


Butt working.
6
53
51
Fully worked
Partially worked
Unworked


Blank type.
3
48
59
Indeterminate
Cobble or nodule
Flake

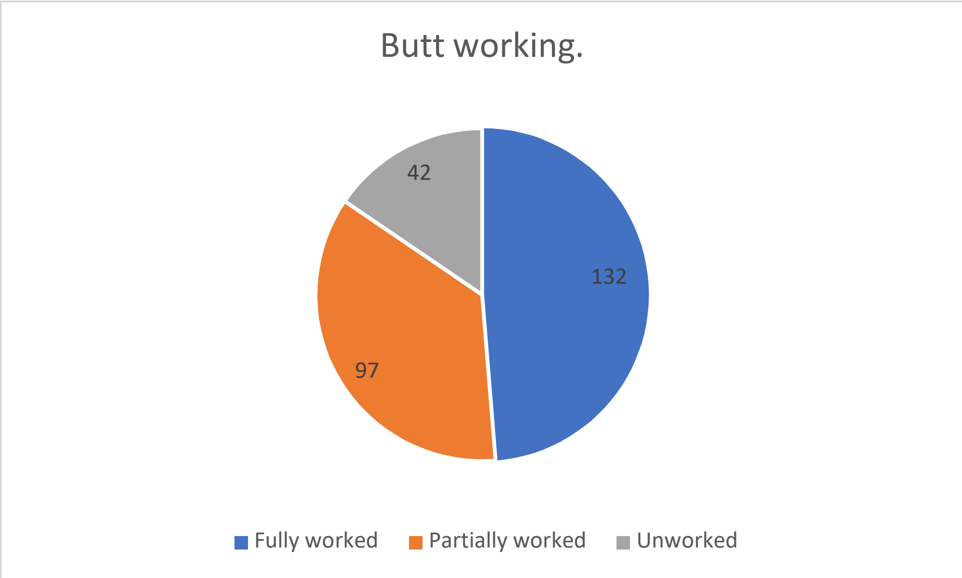

Condition.
9
41
45
15
Very fresh
Slightly rolled
Rolled
Very rolled

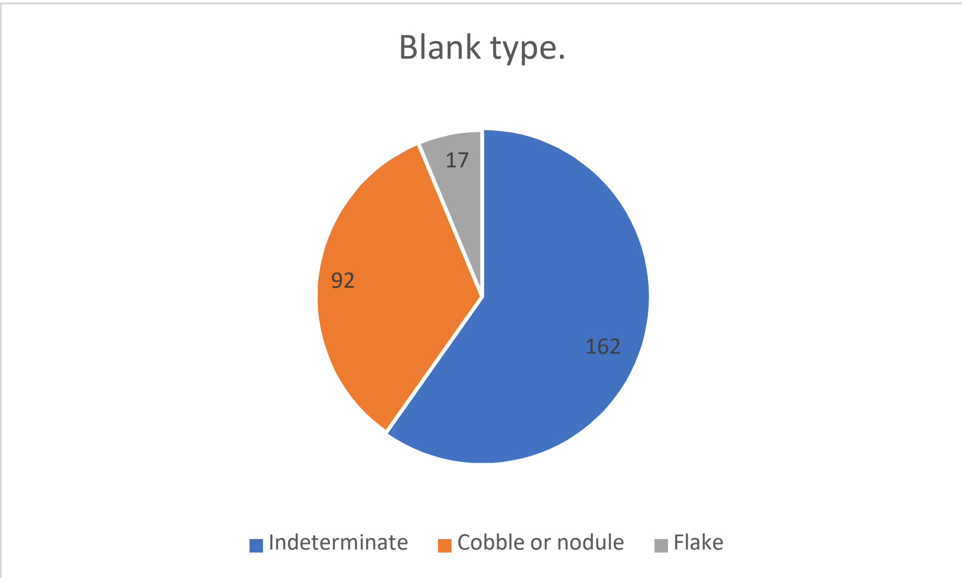
Stoke Newington.

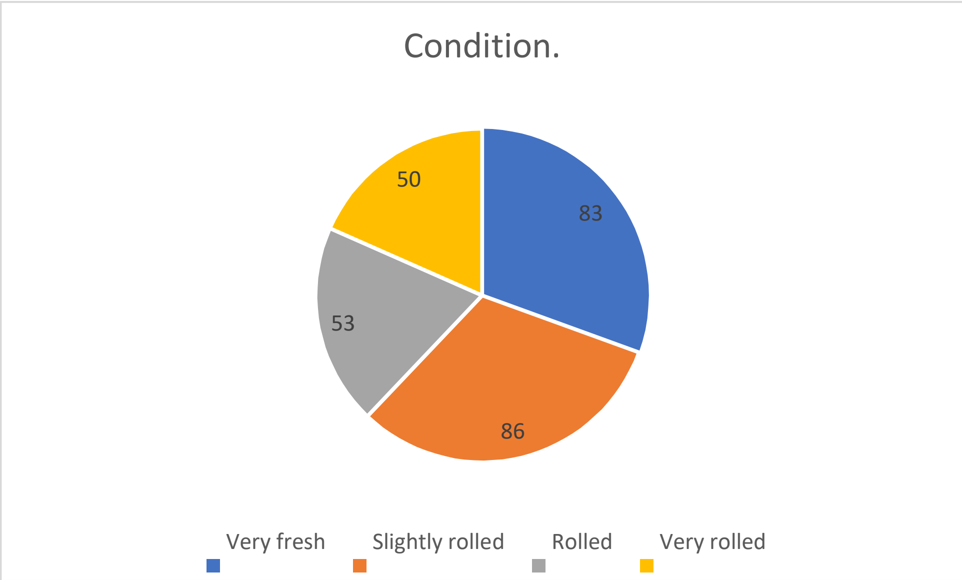


n=271	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	93	58	51	32	175	30	34	52	13	27
Median	88	57	50	31	147	28	32	51	13	26
Mode	86	56	54	26	100	24	29	55	13	27
St. Dev (+/-)	23	13	13	8	117	13	12	13	4	8
Max.	198	107	105	65	752	88	89	90	30	59
Min.	45	29	26	11	25	3	8	19	4	9
CV	24.29	22.51	25.56	26.50	66.93	42.56	34.70	24.30	33.03	29.87

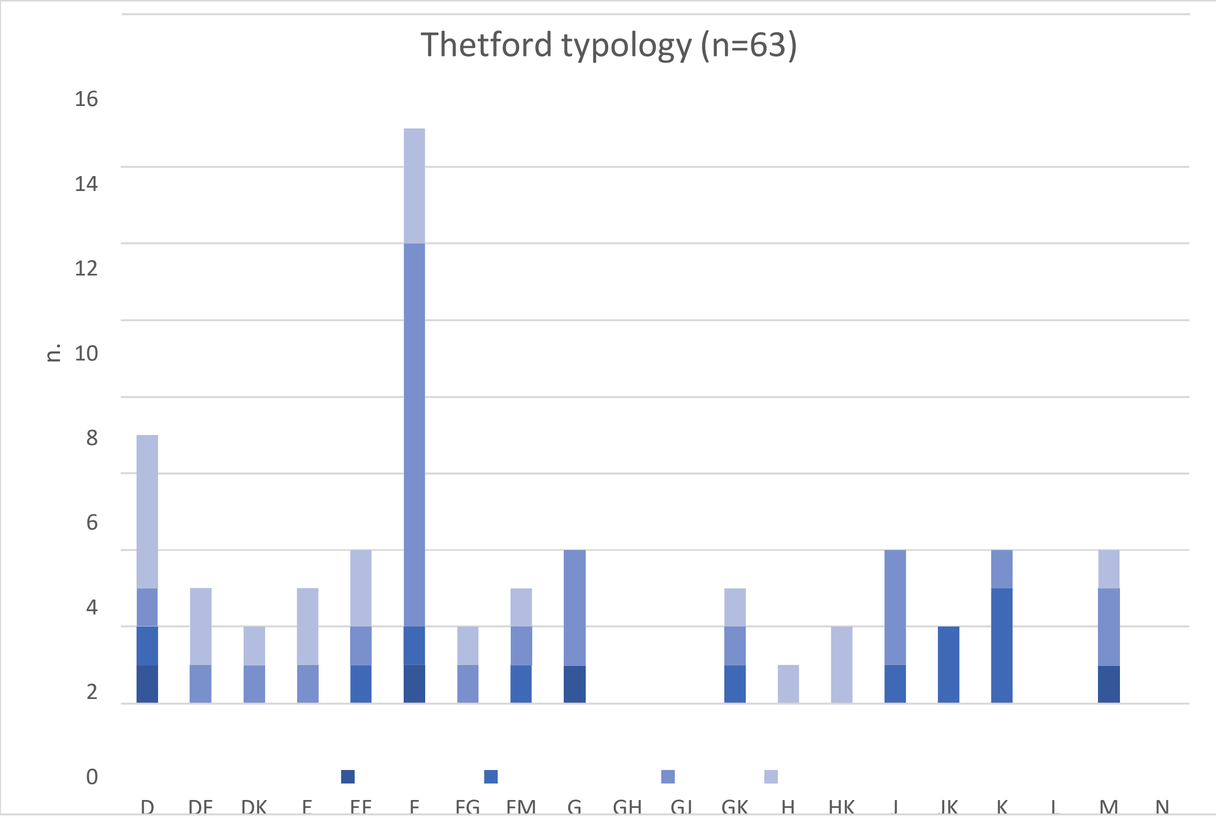
n=271	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.55	0.64	0.32	0.66	0.51
Median	0.54	0.63	0.31	0.62	0.48
Mode	0.55	0.60	0.33	0.50	0.33
St. Dev (+/-)	0.12	0.11	0.11	0.21	0.18
Max.	0.94	1.00	0.72	1.39	1.26
Min.	0.24	0.36	0.04	0.18	0.14
CV	21.81	16.84	35.58	31.18	34.36


Butt working.
42
132
97
Fully worked
Partially worked
Unworked


Blank type.
17
92
162
Indeterminate
Cobble or nodule
Flake

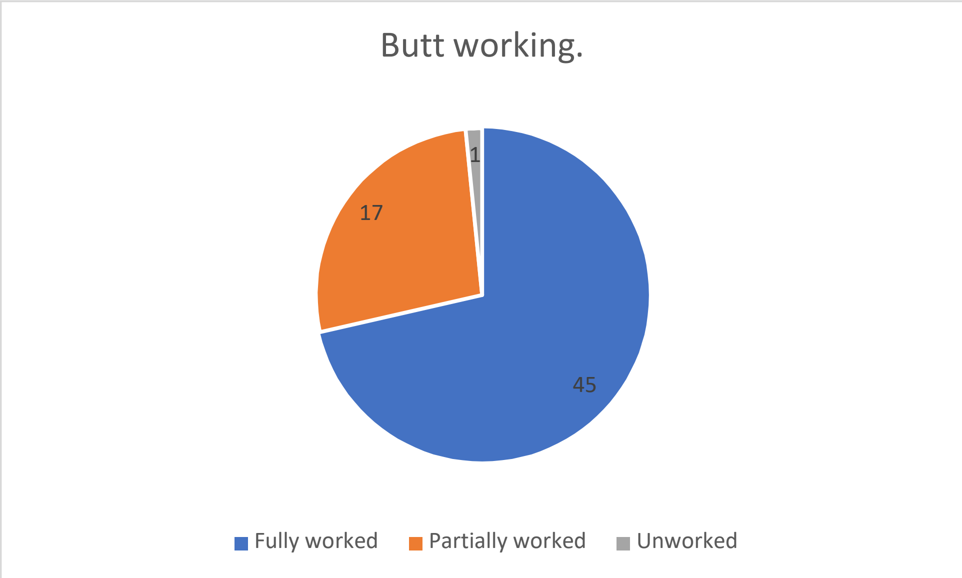

Condition.
83
86
53
50
Very fresh
Slightly rolled
Rolled
Very rolled

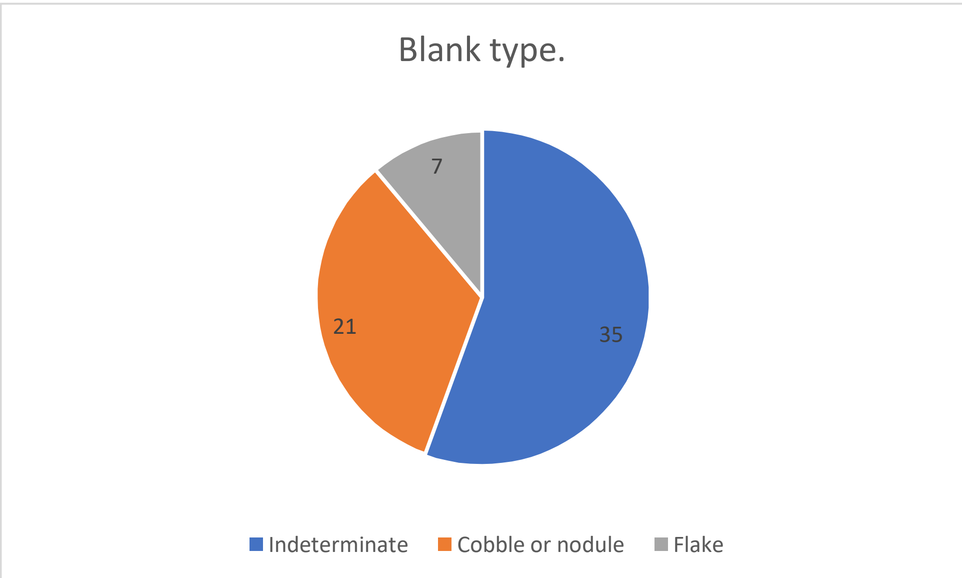
Thetford.

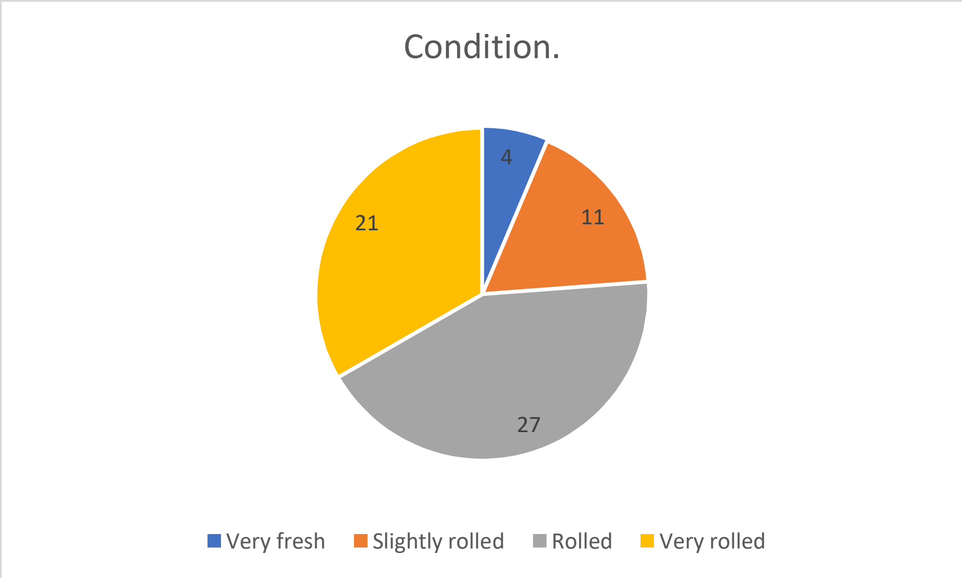


n=63	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	128	76	65	38	336	39	43	68	18	32
Median	125	76	67	36	318	35	42	66	17	33
Mode	112	76	71	34	N/A	35	45	56	20	33
St. Dev (+/-)	30	15	15	10	220	17	13	16	5	9
Max.	224	116	104	66	928	86	86	116	32	52
Min.	76	48	38	20	66	18	20	29	10	14
CV	23.79	19.54	22.32	25.50	65.34	43.65	30.01	22.93	27.20	28.21

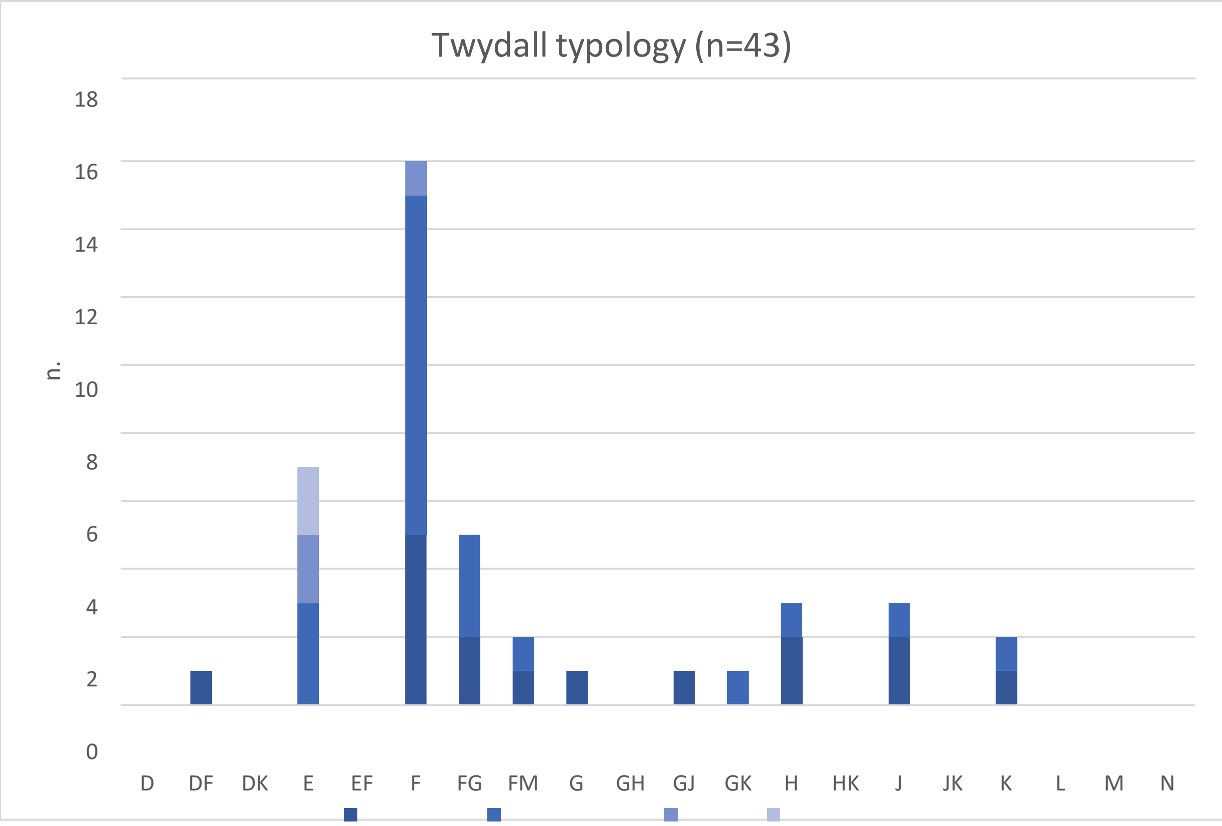
n=63	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.50	0.61	0.31	0.65	0.58
Median	0.48	0.61	0.29	0.61	0.55
Mode	0.46	0.59	N/A	0.58	0.79
St. Dev (+/-)	0.11	0.09	0.11	0.28	0.23
Max.	0.94	0.87	0.64	2.34	2.00
Min.	0.31	0.40	0.15	0.30	0.31
CV	21.98	14.16	36.90	N/A	42.12


Butt working.
1
17
45
Fully worked
Partially worked
Unworked


Blank type.
7
21
35
Indeterminate
Cobble or nodule
Flake

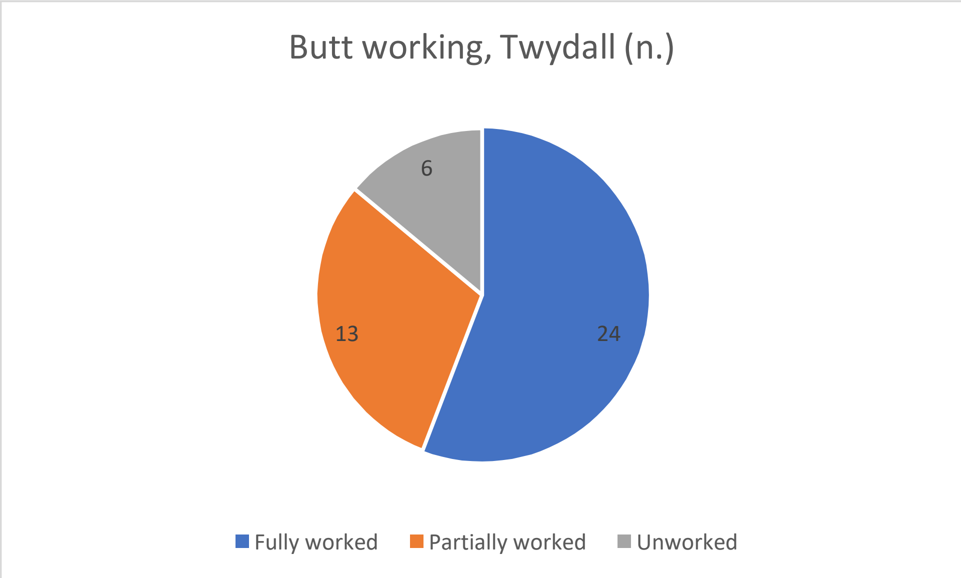

Condition.
4
11
27
21
Very fresh
Slightly rolled
Rolled
Very rolled

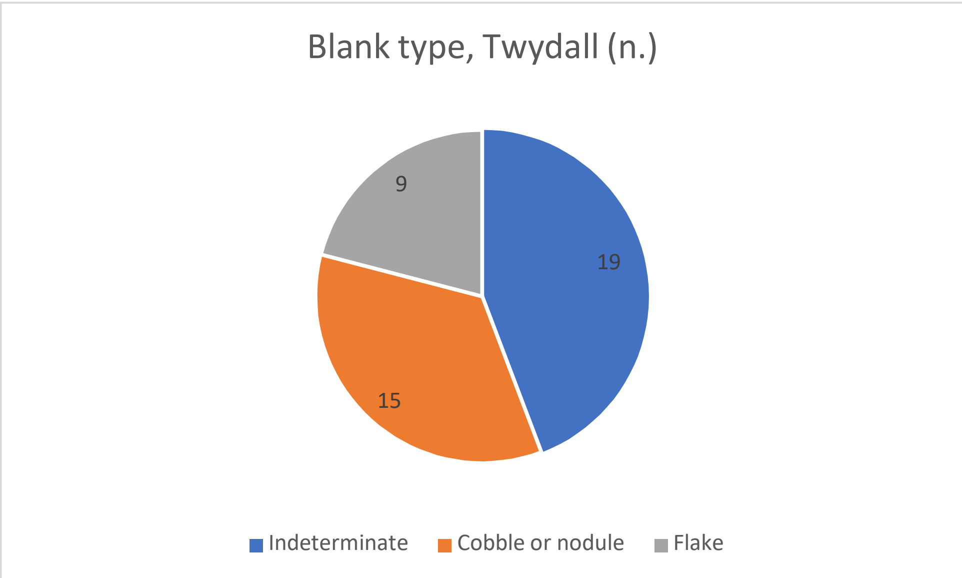
Twydall.

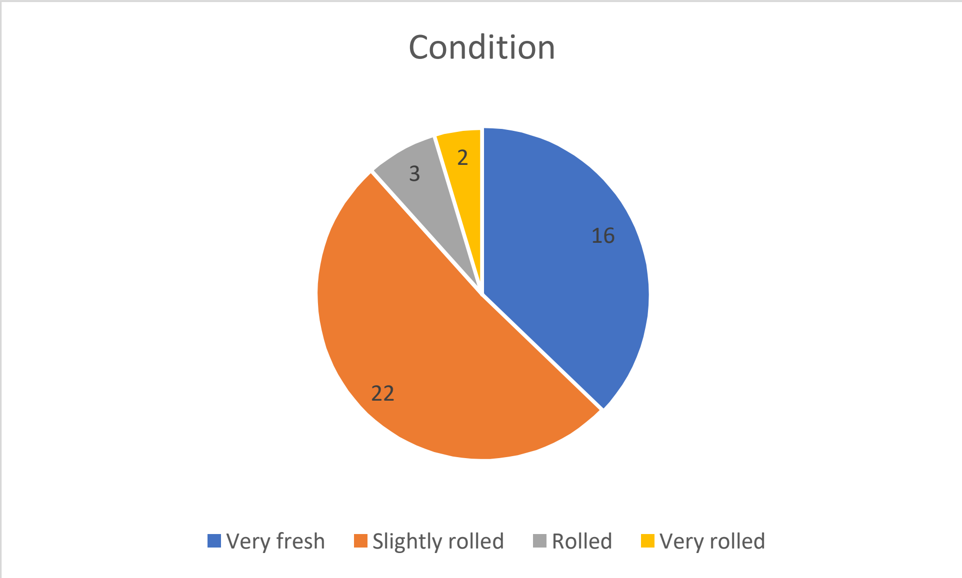


n=43	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	122	71	61	37	313	38	38	64	14	31
Median	116	65	58	38	229	33	37	57	14	30
Mode	107	97	57	39	89	25	37	51	14	34
St. Dev (+/-)	36	17	16	8	216	18	14	15	3	8
Max.	203	108	107	52	924	88	95	97	21	48
Min.	70	47	32	19	74	4	19	40	8	17
CV	29.51	23.69	26.38	23.23	68.96	46.78	37.63	23.43	20.82	27.07

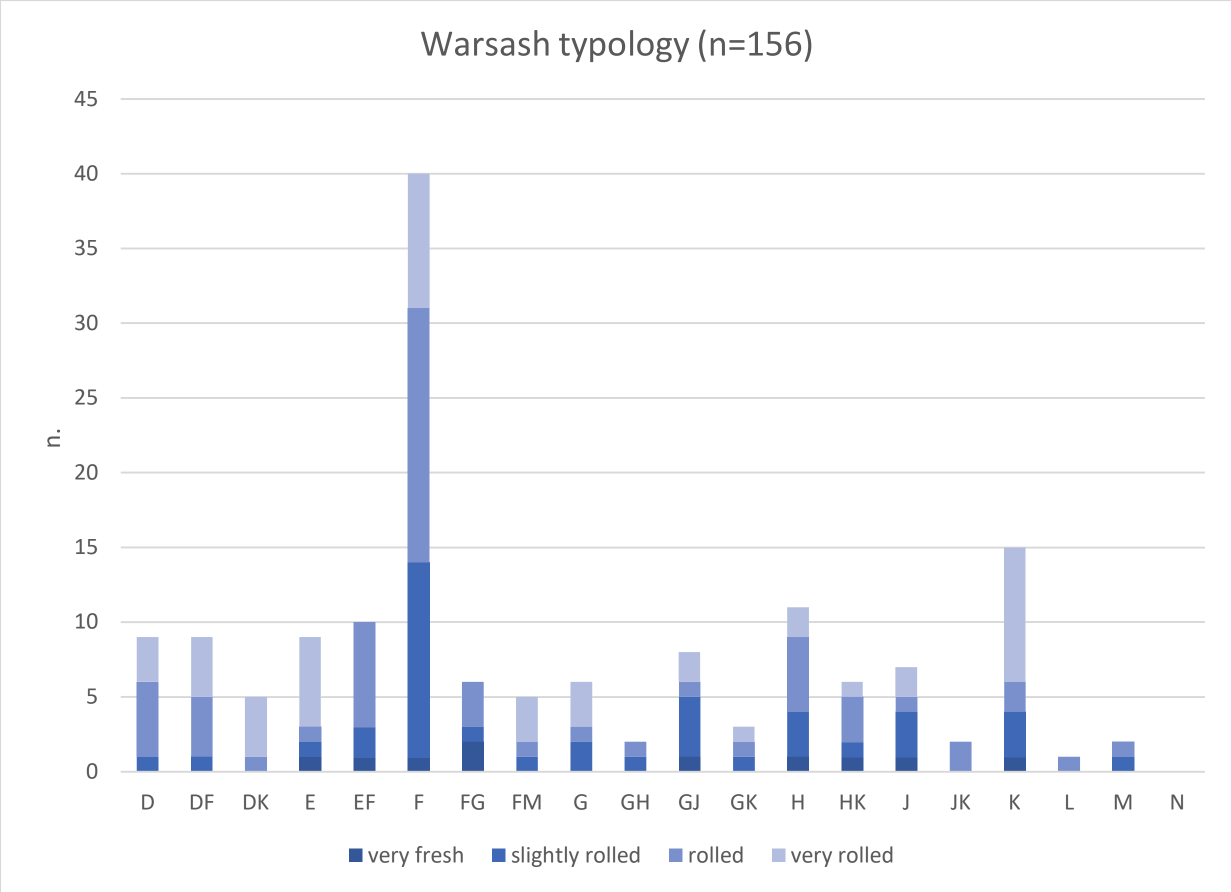
n=43	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.52	0.60	0.31	0.61	0.12
Median	0.50	0.59	0.27	0.59	0.11
Mode	0.50	0.69	N/A	0.66	0.11
St. Dev (+/-)	0.09	0.08	0.12	0.22	0.04
Max.	0.74	0.79	0.56	1.27	0.23
Min.	0.36	0.47	0.06	0.34	0.05
CV	17.21	13.76	37.70	35.12	33.61


Butt working, Twydall (n.)
6
13
24
Fully worked
Partially worked
Unworked


Blank type, Twydall (n.)
9
19
15
Indeterminate
Cobble or nodule
Flake

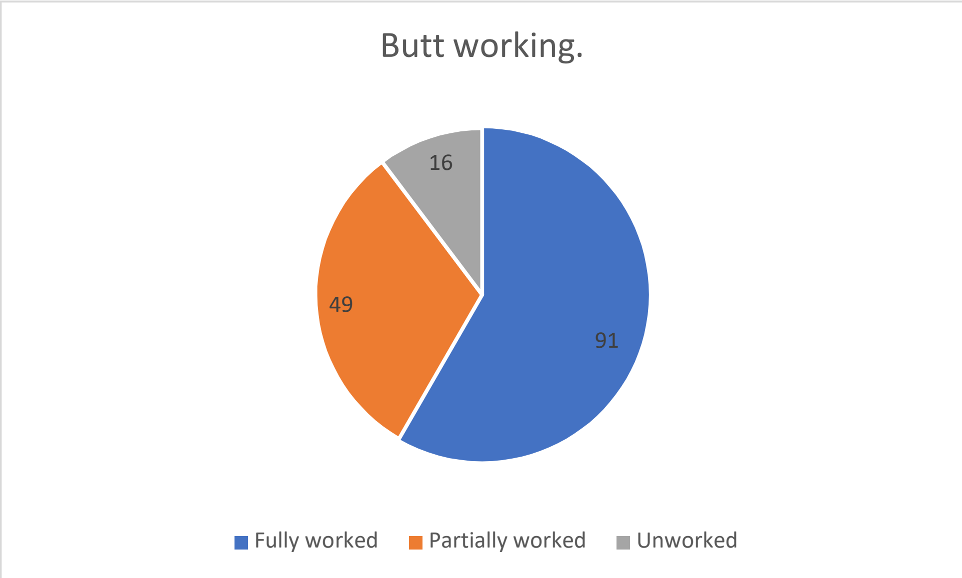

Condition
16
22
3
2
Very fresh
Slightly rolled
Rolled
Very rolled

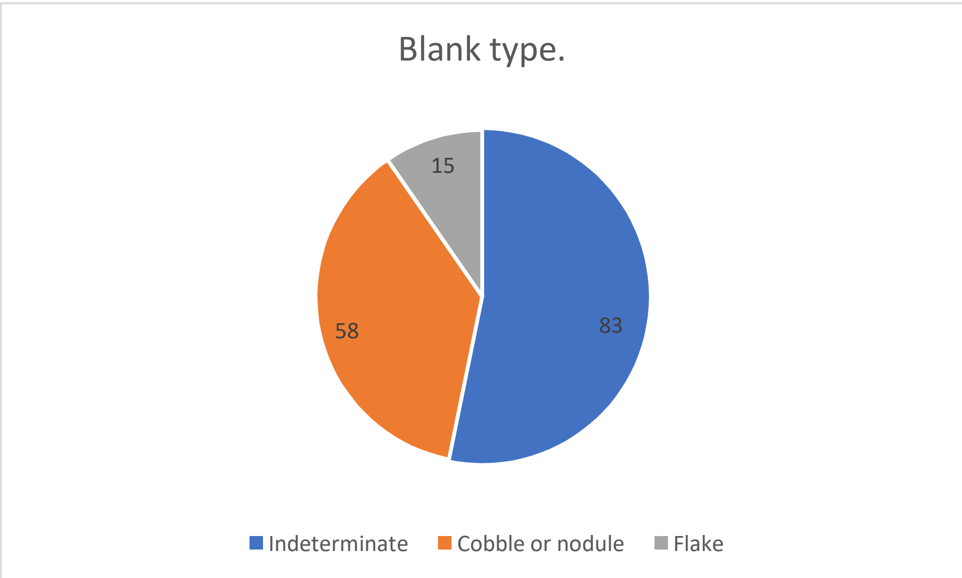
Warsash.

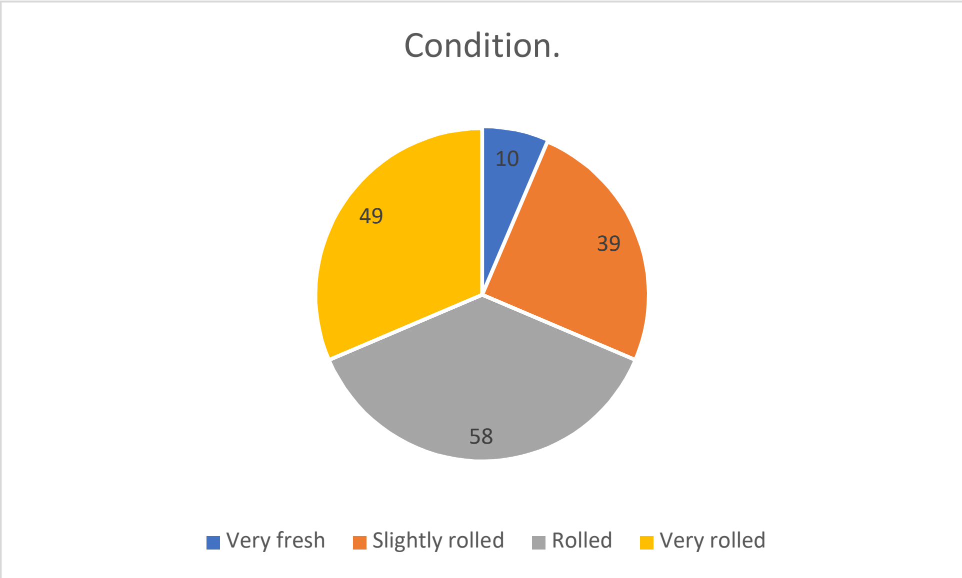


n=156	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	135	79	68	37	417	44	46	70	17	32
Median	135	79	68	37	407	39	41	69	16	31
Mode	135	95	47	37	N/A	38	41	71	17	31
St. Dev (+/-)	37	19	19	10	218	21	18	18	5	10
Max.	262	132	129	63	819	110	112	119	35	62
Min.	60	39	24	15	53	6	16	23	6	10
CV	27.54	24.07	27.75	26.48	52.25	48.52	39.13	26.41	30.60	31.29

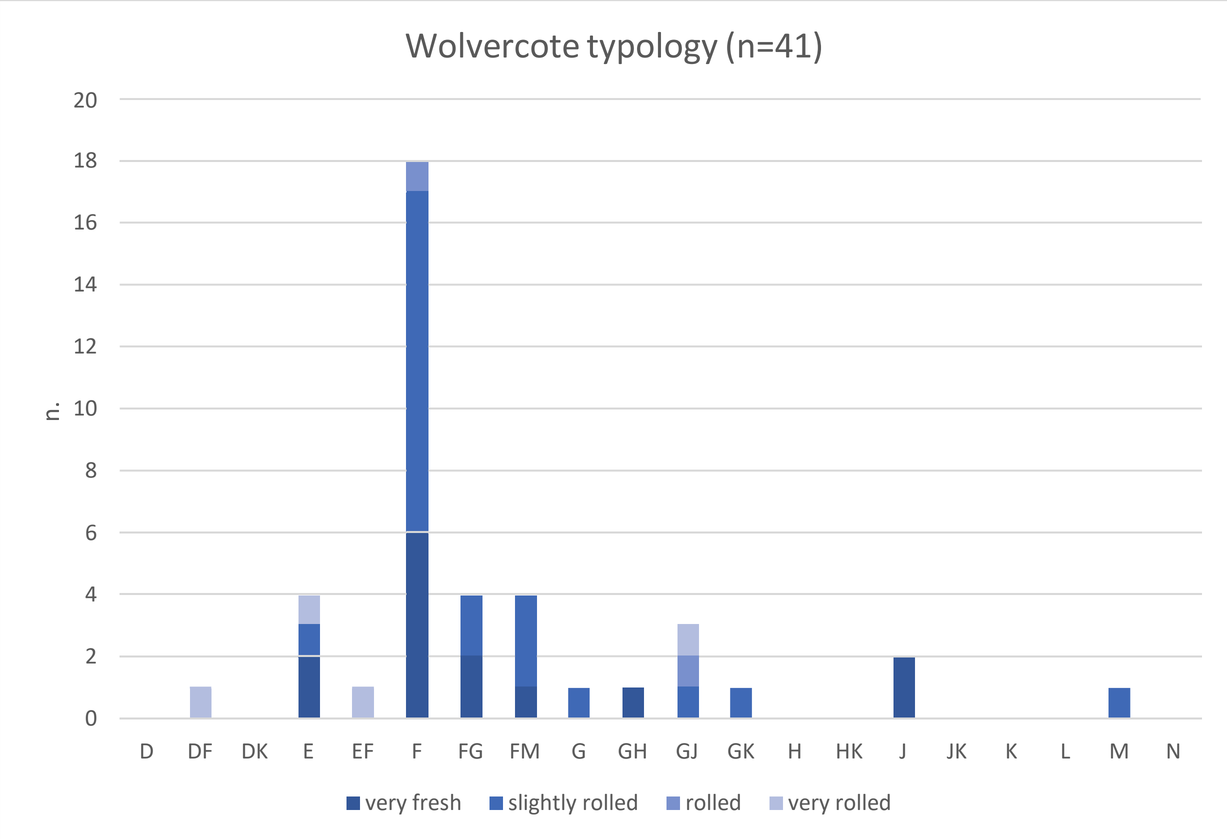
n=156	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.47	0.60	0.33	0.67	0.13
Median	0.46	0.60	0.30	0.61	0.12
Mode	0.50	0.67	0.33	0.50	0.14
St. Dev (+/-)	0.10	0.10	0.13	0.29	0.03
Max.	0.87	0.87	0.80	2.74	0.24
Min.	0.25	0.39	0.07	0.32	0.04
CV	20.21	16.28	41.30	42.58	27.46


Butt working.
16
49
91
Fully worked
Partially worked
Unworked


Blank type.
15
58
83
Indeterminate
Cobble or nodule
Flake

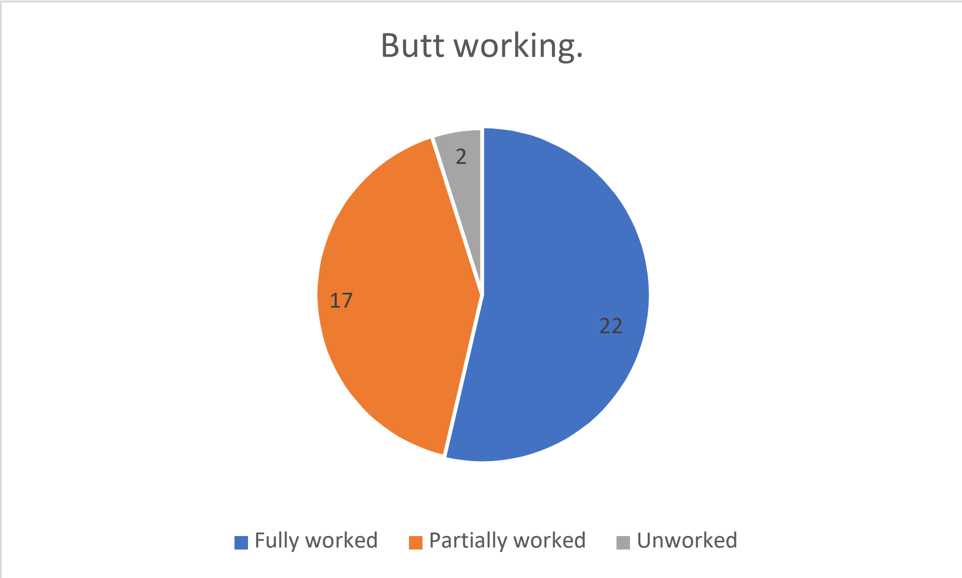

Condition.
10
39
58
49
Very fresh
Slightly rolled
Rolled
Very rolled

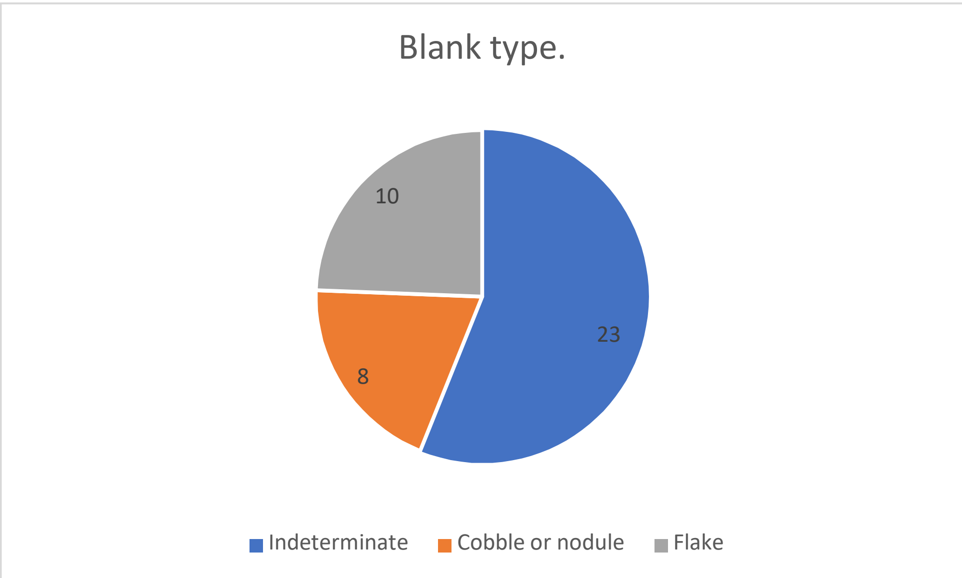
Wolvercote.

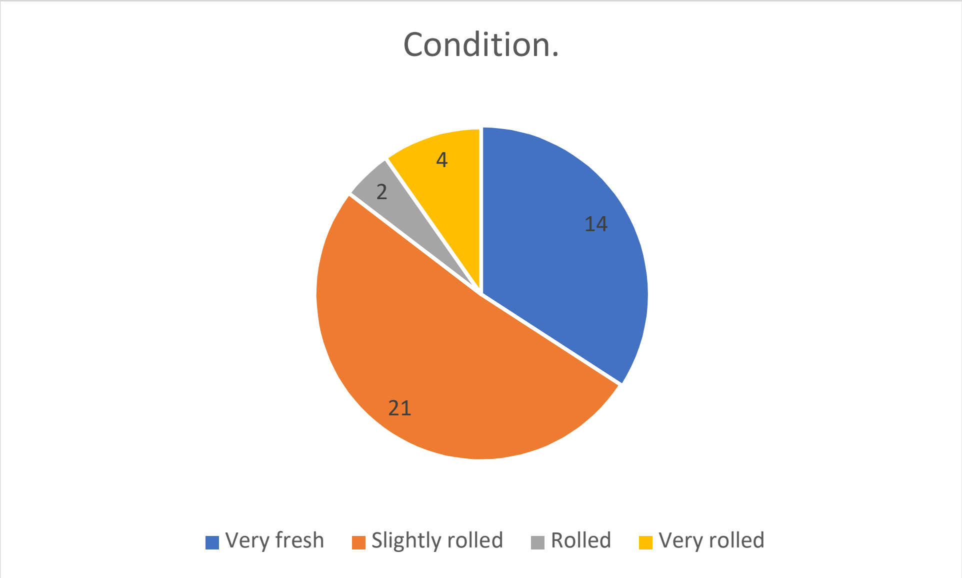


n=41	L (mm)	B (mm)	XB (mm)	T (mm)	Wt (g)	L1 (mm)	B1 (mm)	B2 (mm)	T1 (mm)	T2 (mm)
Mean	112	68	59	32	N/A	30	35	62	15	28
Median	107	66	56	31	N/A	29	31	63	15	28
Mode	120	66	44	31	N/A	20	24	65	15	28
St. Dev (+/-)	38	17	16	7	N/A	12	11	17	4	7
Max.	217	113	102	50	N/A	68	65	99	23	42
Min.	46	39	37	18	N/A	11	22	30	8	15
CV	33.40	25.52	26.45	21.03	N/A	38.10	32.01	26.58	26.70	23.22

n=41	Refinement (T/B)	Elongation (B/L)	Planform (L1/L)	Tip shape (B1/B2)	Cross-sectional uniformity (T1/T2)
Mean	0.49	0.63	0.28	0.57	0.31
Median	0.46	0.62	0.27	0.54	0.31
Mode	0.46	N/A	N/A	0.49	N/A
St. Dev (+/-)	0.12	0.13	0.08	0.15	0.08
Max.	0.95	0.98	0.51	1.03	0.48
Min.	0.31	0.40	0.14	0.34	0.15
CV	23.91	20.36	30.00	26.07	24.59


Butt working.
2
17
22
Fully worked
Partially worked
Unworked


Blank type.
10
23
8
Indeterminate
Cobble or nodule
Flake


Condition.
14
21
2
4
Very fresh
Slightly rolled
Rolled
Very rolled

APPENDIX IV – WYMER'S DATA (WYMER 1968).

Type	Wolvercote	Iffley	Ewelme	Benson	Farthingwood Green	Toots Farm	Highmoor	Kidmore	Roebucks Pit	Grovelands	Sonning Hill	Sonning Cutting	Butts Hill	Ruscombe Priors Pit	Ruscombe Northbury Farm	Kennylands	Highlands Farm	Shiplake House Farm	Hamiltons Pit	Cookham Rise
D	0	2	2	1	7	6	0	4	0	1	0	0	2	2	0	19	53	0	2	4
DF	0	1	1	2	6	14	3	11	0	0	1	0	3	13	2	7	11	4	0	11
E	20	14	5	5	6	51	0	46	1	17	2	1	1	19	7	10	56	9	21	23
EF	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	1	0
F	31	9	14	17	3	105	8	32	5	18	3	9	8	68	8	3	3	17	10	42
FG	1	0	5	6	4	21	3	4	4	1	2	3	0	10	1	0	0	0	7	12
FM	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
G	6	2	2	8	2	15	1	7	11	5	0	2	0	9	1	0	0	3	1	9
GH	0	0	0	0	1	1	0	0	0	0	1	0	0	7	1	0	0	0	0	7
GJ	0	0	1	1	0	5	1	0	0	0	4	0	0	2	0	0	0	0	0	0
GK	0	0	1	0	10	2	2	1	1	2	0	1	2	7	1	5	5	2	0	3
H	0	0	0	0	0	1	0	2	0	2	0	0	1	2	0	1	0	0	1	13
HK	0	0	0	0	1	0	0	0	5	2	0	0	0	1	0	2	4	0	0	0
J	0	0	12	7	4	1	4	4	37	11	2	0	0	1	1	9	19	2	2	2
JK	0	0	5	1	13	1	0	1	9	0	2	0	0	0	0	16	51	7	2	1
K	0	0	3	6	10	6	1	1	39	20	0	0	0	0	2	11	34	1	6	1
L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
M	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
N	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	58	28	52	54	67	242	23	114	112	79	17	16	17	141	24	83	236	46	53	130

Type	Cannoncourt Farm, Furze Platt	Deverills and Coopers Pit	Lent Rise, Burnham	Bakers Farm	Croxley Green	Rickmanswor -th	Iver, GWR Pit	Iver	Hillingdon	Dawley	Southall Gas Works	Hanwell	Ealing and Acton	Wandsworth District	Leyton and Leytonstone	Stamford Hill	Stoke Newington ("floor")	Stoke Newington gravel	Upper Clapton	Lower Clapton
D	25	2	5	17	7	4	0	1	10	3	0	3	0	2	1	1	0	3	0	4
DF	78	11	24	21	12	16	4	11	19	12	0	16	6	1	3	2	2	13	2	5
E	141	48	34	31	24	66	7	36	66	34	5	80	23	10	10	38	35	98	21	50
EF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	215	66	111	49	3	81	9	32	80	39	5	51	23	11	5	14	21	30	4	35
FG	42	18	12	5	4	19	1	2	23	6	1	5	2	0	0	2	3	3	0	2
FM	**12**	**1**	**5**	**2**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**
G	22	14	8	3	3	13	1	2	25	7	0	5	1	4	2	2	1	1	0	6
GH	8	1	5	1	0	5	0	0	3	0	0	1	2	0	0	1	9	1	0	1
GJ	0	5	2	0	0	0	0	0	4	1	0	1	1	0	0	2	0	0	1	0
GK	0	2	6	4	6	6	2	3	0	1	1	2	3	3	0	1	3	0	1	0
H	16	1	7	10	2	2	1	0	5	1	0	0	0	1	3	1	2	2	0	0
HK	5	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
J	1	24	1	2	12	3	3	6	10	0	0	9	2	1	0	2	0	2	0	5
JK	1	28	1	2	7	1	0	0	1	1	0	0	2	0	0	2	1	0	1	2
K	1	18	3	0	5	6	0	1	1	2	0	0	2	1	0	7	0	3	0	2
L	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	567	239	224	148	86	222	28	94	252	107	12	174	69	34	25	75	77	157	30	113

Sites which Wymer (1968) had located on the Lynch Hill terrace are highlighted. Values for ficron type handaxes (types FM and M) are indicated in **bold**.

BIBLIOGRAPHY.

Aldhouse-Green, S., Peterson, R. and Walker, E.A. (eds.) (2012). *Neanderthals in Wales: Pontnewydd and the Elwy Valley Caves*. Oxford: Oxbow Books.

Allington-Jones, L. (2015). The Clacton spear: The last one hundred years. *Archaeological Journal* 172(2), p.273 – 296.

Antoine, P., Coutard, S., Bahain, J.J., Locht, J.L., Hérisson, D. and Goval, E. (2021). The last 750 ka in loess–palaeosol sequences from northern France: environmental background and dating of the western European Palaeolithic. *Journal of Quaternary Science* 10.1002/jqs.3281.

Anzidei, A.P., Biddittu, I., Gioia, P., Mussi, M. and Piperno, M. (2001). Lithic and bone industries of OIS 9 and OIS 7 in the Roman area. In *La terra degli Elefanti. Actas del 1 Congreso Internacional. Roma 16-20 Octubre 2001*, p. 3 – 9. Roma: Consiglio Nazionale delle Ricerche.

Archer, W. and Braun, D.R. (2010). Variability in bifacial technology at Elandsfontein, Western cape, South Africa: a geometric morphometric approach. *Journal of Archaeological Science* 37(1), p.201-209.

Arkell, W.J. 1945. Palaeoliths from the Wallingford Fan-gravels. *Oxoniensia* 8(9), p.1 – 18.

Arzarello, M. and Moncel, M.H (2021). From the Earliest Occupations of Europe to Recent Bifacial Productions. *Journal of Paleolithic Archaeology* 4 (1). https://doi.org/10.1007/s41982-021-00083-8

Ashton, N. (1998). The taphonomy of flint assemblages. In N. Ashton, S. G. Lewis, S. Parfitt, (eds.), *Excavations at the Lower Palaeolithic site at East Farm, Barnham, Suffolk 1989-94 Occasional paper No. 125*, p. 183 – 204. London: British Museum Press.

Ashton, N. (2001). One step beyond. Flint shortage above the Goring Gap: the example of Wolvercote. In: S. Milliken and J. Cook (eds) *A Very Remote Period Indeed: Papers on the Palaeolithic Presented to Derek Roe*, pp. 199 – 206. Oxford: Oxbow.

Ashton, N. (2008). Transport, curation and resharpening of lithics in the Lower Palaeolithic. *Lithics* 29, p.6 – 17.

Ashton, N. (2018). Landscapes of habit and persistent places during MIS 11 in Europe: A return journey from Britain. In: M. Pope, J. McNabb and C. Gamble (eds) *Crossing the human threshold: Dynamic transformation and persistent places during the Middle Pleistocene*, pp.142 – 164. Abingdon: Routledge.

Ashton, N., and Davis, R. (2021). Cultural mosaics, social structure, and identity: The Acheulean threshold in Europe. *Journal of Human Evolution* 156, p.103011.

Ashton, N. and Hosfield, R. (2010). Mapping the human record in the British early Palaeolithic: evidence from the Solent River system. *Journal of Quaternary Science* 25(5), p.737 – 753.

Ashton, N. and Lewis, S. (2002). Deserted Britain: declining populations in the British late Middle Pleistocene. *Antiquity* 76(292), p.388 – 396.

Ashton, N. and McNabb, J. (1992). 'The interpretation and context of the High Lodge industries',industries. In (eds.) N. Ashton, J. Cook, S. Lewis, and J. Rose (eds.) *High Lodge: Excavations by G. de G. Sieveking, 1962-8, and J. Cook, 1988*., pp.164 – 168. London,: British Museum. 164-168.

Ashton, N. and McNabb, J. (1994). Bifaces in perspective. In: N. Ashton and A. David (eds) *Stories in*

Stone: Lithic Studies Society Occasional Papers 4, p.182-191. London: Lithic Studies Society.

Ashton, N. and Scott, B. (2016). The British Middle Palaeolithic. *Quaternary International* 411, p.62 – 76.

Ashton, N. and White, M.J. (2003). Bifaces and Raw Materials: Flexible flaking in the British early Palaeolithic. In: M. Soressi and H.L. Dibble (eds) *Multiple Approaches to the Study of Bifacial Technologies*, pp. 109 – 124. University of Pennsylvania: Museum of Archaeology and Anthropology.

Ashton, N., McNabb, J. and Parfitt, S. (1992). Choppers and the Clactonian: A reinvestigation. *Proceedings of the Prehistoric Society* 58(1), p. 21 – 28.

Ashton, N., McNabb, J., Irving, B., Lewis, S. and Parfitt, S. (1994a). Contemporaneity of Clactonian and Acheulian flint industries at Barnham, Suffolk, *Antiquity* 68, 585 – 589.

Ashton, N., Bowen, D.Q., Holman, J.A., Hunt, C.O., Irving, B.G., Kemp, R.A., Lewis, S.G., McNabb, J., Parfitt, S. and Seddon, M.B. (1994b). Excavations at the lower Palaeolithic site at east farm, Barnham, Suffolk 1989–92. *Journal of the Geological Society* 151(4), p.599 – 605.

Ashton, N., Lewis, S.G. and Parfitt, S.A. (Eds.) (1998). *Excavations at Barnham, 1989-94*. London: British Museum Occasional Paper 125.

Ashton N.M., Jacobi R.M. and White M.J. (2003). The dating of Levallois sites in West London. *Quaternary Newsletter* 99, p. 25–32.

Ashton, N., Lewis, S., Parfitt, S., Candy, I., Keen, D., Kemp, R., Penkman, K., Thomas, G., Whittaker, J. and White, M.J. (2005). Excavations at the Lower Palaeolithic site at Elveden, Suffolk, UK. *Proceedings of the Prehistoric Society* 71, p. 1–61.

Ashton, N., Lewis, S.G., Parfitt, S. and White, M. (2006). Riparian landscapes and human habitat preferences during the Hoxnian (MIS 11) Interglacial. *Journal of Quaternary Science: Published for the Quaternary Research Association* 21(5), p. 497 – 505.

Ashton, N., Lewis, S.G., Parfitt, S., Penkman, K.E.H. and Coope, G.R. (2008). New evidence for complex climate change in MIS 11 from Hoxne, UK. *Quaternary Science Reviews* 27 (7 – 8), p. 652–668.

Ashton, N., Lewis, S.G. and Hosfield, R. (2011). Mapping the human record: population change in Britain during the Early Palaeolithic. *Developments in Quaternary Sciences* 14, p. 39 – 51.

Ashton N., Lewis S.G., and De Groote, I. (2014). Hominin footprints from early Pleistocene deposits at Happisburgh, UK. *PLoS One* 9:e88329.

Ashton, N., Lewis, S.G. and Harris, C.R. (2015). The distribution of early Palaeolithic sites in Britain. In: N. Ashton, C.R.E. Harris and R. Jacobi (eds) *No Stone Unturned: Papers in Honour of Roger Jacobi*: *Lithic Studies Society Occasional Paper, 9*, pp. 19 – 30. London: Lithic Studies Society.

Ashton, N., Lewis, S.G., Parfitt, S.A., Davis, R.J. and Stringer, C. (2016). Handaxe and non-handaxe assemblages during Marine Isotope Stage 11 in northern Europe: recent investigations at Barnham, Suffolk, UK. *Journal of Quaternary Science* 31(8), p.837 – 843.

Ashton, N., Harris, C.R. and Lewis, S.G. (2018). Frontiers and route-ways from Europe: The Early Middle Palaeolithic of Britain. *Journal of Quaternary Science* 33(2), p.194 – 211.

Auguste, P. (2009). Evolution des peuplements Mammaliens en Europe du Nord-Ouest Durant Le

Pleistocene Moyen et Superieur. Le Cas de la France Septentrionale. *Quaternaire* 20(4), p.527 – 550.

Austin, L. (1994). The life and death of a Boxgrove biface. In: N. Ashton and A. David (eds) *Stories in Stone: Lithic Studies Society Occasional Papers 4*, p.119-127. London: Lithic Studies Society.

Baden-Powell, D.F.W. and West, R.G. (1960). Summer Field Meeting in East Anglia: 14–24 August 1958. *Proceedings of the Geologists' Association* 71(1), p.61– 80.

Bahain, J.J., Falguères, C., Laurent, M., Voinchet, P., Dolo, J.M., Antoine, P. and Tuffreau, A. (2007). ESR chronology of the Somme River Terrace system and first human settlements in Northern France. *Quaternary Geochronology* 2(1-4), p.356 – 362.

Bar-Yosef, O. and Goren-Inbar, N. (1993). The Lithic Assemblages of 'Ubeidiya: A Lower Palaeolithic site in the Jordan Valley. *Qedem* 34: III-266. Accessed on May 22, 2020, URL: www.jstor.org/stable/43587057.

Barkai, R. (2020). Lower Paleolithic bone handaxes and chopsticks: Tools and symbols? *Proceedings of the National Academy of Sciences* 117(49), p.30892 – 30893.

Barnes, A.S. (1930). The Industries of Le Moustier. *Proceedings of the Prehistoric Society of East Anglia* 6(3), p.234 – 242.

Barsky, D. (2013). The Caune de l'Arago stone industries in their stratigraphical context. *Comptes Rendus Palevol* 12(5), p.305 – 325.

Barsky, D., and de Lumley, H. (2010). Early European Mode 2 and the stone industry from the Caune de l'Arago's archeostratigraphical levels "P". *Quaternary International* 223–224, p.71–86

Barsky, D., Carbonell, E. and Ramos, R.S. (2018). Diversity and multiplicity in the Asian Acheulian. *L'Anthropologie* 122(1), p.59 – 73.

Bassinot, F.C., Labeyrie, L.D., Vincent, E., Quidelleur, X., Shackleton, N.J. and Lancelot, Y. (1994). The astronomical theory of climate and the age of the Brunhes-Matuyama magnetic reversal. *Earth and Planetary Science Letters* 126(1-3), p.91 – 108.

Bates, M.R. and Briant, R.M. (2009). Quaternary sediments of the Sussex/Hampshire Coastal Corridor: a brief overview. In: R.M. Briant, M.R. Bates, R.T. Hosfield and F.F. Wenban-Smith (eds) *The Quaternary of the Solent Basin and West Sussex Raised Beaches: Field Guide,* p. 21 – 41. London: Quaternary Research Association.

Bates, M.R., Bates, C.R., Gibbard, P.L., Macphail, R.I., Owen, F.J., Parfitt, S.A., Preece, R.C., Roberts, M.B., Robinson, J.E., Whittaker, J. and Wilkinson, K.N. (2000). Late Middle Pleistocene deposits at Norton Farm on the West Sussex coastal plain, southern England. *Journal of Quaternary Science* 15, 61– 89.

Bates, M.R., Wenban-Smith, F.F., Bello, S.M., Bridgland, D.R., Buck, L.T., Collins, M.J., Keen, D.H., Leary, J., Parfitt, S.A., Penkman, K. and Rhodes, E. (2014). Late persistence of the Acheulian in southern Britain in an MIS 8 interstadial: evidence from Harnham, Wiltshire. *Quaternary Science Reviews* 101, p.159 – 176.

Bednarik, R.G. (1999). Maritime navigation in the Lower and Middle Palaeolithic. *Comptes Rendus de l'Académie des Sciences-Series IIA – Earth and Planetary Science* 328(8), p.559 – 563.

Bee, T.W. (2001). Palaeolithic handaxes from the Lymn Valley, Lincolnshire. *Lithics* 22, p.47 – 52.

Begin Z.B., Meyer D.F. and Schumm S.A. (1981). Development of longitudinal profiles of alluvial channels in response to base-level lowering. *Earth Surface Processes and Landforms* 6, p. 49–68.

Bell, A.M. (1894). Palaeolithic remains at Wolvercote, Oxfordshire, I & II. *Antiquary* 30, 148 – 152; 192 – 198.

Bell, A.M. (1904). Implementiferous sections at Wolvercote (Oxfordshire). *Quarterly Journal of the Geological Society of London* 60, p.120 – 132.

Bellamy, A.G. (1998). The UK marine sand and gravel dredging industry: an application of Quaternary geology. *Geological Society, London, Engineering Geology Special Publications* 13(1), p.33– 46.

Beresford, F.R. (2019). Palaeolithic material from Lower Twydall Chalk Pit in Kent: the Cook and Killick collection. *Lithics* 39, p.20 – 35.

Bergman, C.A. and Roberts, M.B. (1988). Flaking technology at the Acheulean site of Boxgrove, West Sussex (England). *Revue archéologique de Picardie* 1–2, p.105–113.

Bergman, C.A., Roberts, M.B., Collcutt, S.N. and Barlow, P. (1990). Refitting and spatial analysis of artefacts from Quarry 2 at the Middle Pleistocene site of Boxgrove, West Sussex, England. In E. Cziesla, S. Eickhoff, N. Arts and D. Winter (eds) *The Big Puzzle International Symposium on Refitting Stone Artefacts, Monrepos, 1987*: p. 265–282. Bonn: Holos.

Baber, C. and Janulis, K. (2021). Purposeful tool use in early lithic technologies. *Adaptive Behavior* 29(2), p.169 – 180.

Bergmann, C. (1848). *Über die Verhältnisse der Wärmeökonomie der Thiere zu ihrer Grösse*.

Betts, T. (1975). Notes on the Pollen Sampling at Southend Rd. Woodford, TQ 408905. Unpublished manuscript, currently in the care of M. White.

Betts, T. (n.d.). Untitled report on excavations at Southend Road, South Woodford. Held in the archive of Essex County Council.

Beyene Y., Zeleke Y., and Uzawa K. (1997). The Acheulean at Konso-Gardula: results from locality KGA4-A2. In: K. Fukui, E. Kurimoto and M. Shigeta (eds) *Ethiopia in broader perspective: papers of the XIIIth International Conference of Ethiopian Studies, Kyoto, 12–17 December 1997:* p.376–381. Kyoto, Japan: Shokado.

Beyene, Y., Katoh, S., Wolde Gabriel, G., Hart, W.K., Uto, K., Sudo, M., Kondo, M., Hyodo, M., Renne, P.R., Suwa, G. and Asfaw, B. (2013). The characteristics and chronology of the earliest Acheulean at Konso, Ethiopia. *Proceedings of the National Academy of Sciences* 110(5), p.1584 – 1591.

Beyries, S. and Boeda E. (1983). Etude technologique et traces d'utilization des 'eclats debordants' de Corehem (Pas-de-Calais). *Bulletin de la Societe Prehistorique Francaise* 80(9), p.275 – 279.

Biddittu, I., Canetri, E., Comerci, V., Germani, M., and Picchi, G. (2012). Nuove ricerche nel giacimento del Paleolitico inferiore di Lademagne, S Giovanni Incarico (Frosinone). *Lazio e Sabina Edizioni Quasar* 9, p 437 – 443.

Biddittu, I., Moncel, M.H., Milli, S., Bellucci, L., Ruffo, M., Saracino, B. and Manzi, G. (2020). Stratigraphy, sedimentology, and archaeology of Middle Pleistocene localities near Ceprano, Campogrande area, Italy. *Quaternary Research* 93(1), p.155 – 171.

Binford, L.R. (1980). Willow smoke and dogs' tails: hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45(1), p. 4 – 20.

Binford, L.R. (2001). *Constructing frames of reference: an analytical method for archaeological theory building using ethnographic and environmental data sets*. Berkeley, CA.: University of California Press.

Binford, L.R. and Binford, S.R. (1966). A preliminary analysis of functional variability in the Mousterian of Levallois facies. *American Anthropologist* 68(2), p.238 – 295.

Binford, S.R. and Binford, L.R. (1969). Stone tools and human behaviour. *Scientific American* 220, p.70–84.

Bishop, W.W. (1958). The Pleistocene geology and geomorphology of three gaps in the Midland Jurassic escarpment. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 241(682), p.255 – 306.

Blackmore, H. P. (1864). Discovery of flint implements in the higher-level gravel at Milford Hill, Salisbury. *The Archaeological Journal* 21, p.243–245.

Blackmore, H. P. (1865). On the discovery of flint implements in the drift at Milford Hill, Salisbury. *Quarterly Journal of the Geological Society* 21(1–2), p.250–252.

Blackmore, H. P. (1867). On the recent discovery of flint implements in the drift of the Valley of the Avon. *Wiltshire Archaeological and Natural History Magazine* 10, p.221–233.

Blain, H.A., Fagoaga, A., Ruiz-Sánchez, F.J., García-Medrano, P., Ollé, A. and Jiménez-Arenas, J.M. (2021). Coping with arid environments: A critical threshold for human expansion in Europe at the Marine Isotope Stage 12/11 transition? The case of the Iberian Peninsula. *Journal of Human Evolution* 153, p.102950.

Blake, J.H. and Stevens, J. (1885). Excursion to reading: Saturday, June 6th, 1885. *Proceedings of the Geologists' Association* 9(4), p.209 – 212.

Blaser, F. and Chaussé, C. (2016). Saint-Illiers-la-Ville and the Micoquian of Weichselian sequences of the Paris Basin. *Quaternary International* 411, p.163 – 178.

Bocquet-Appel, J.P. and Tuffreau, A. (2009). Technological responses of Neanderthals to macroclimatic variations (240,000–40,000 BP). *Human Biology* 81(3), p.287-307.

Boëda, E. (1995). Levallois: A volumetric construction, methods, a technique. In H. Dibble and O. Bar-Yosef (eds.), *The definition and interpretation of Levallois technology. Monographs in World archaeology no. 23,* pp. 41 – 68. Madison, WI: Prehistory Press.

Bordes, F. (1953). Essai de classification des industries 'mousteriennes'. *Bulletin de la Société préhistorique française* 50, p.457–466.

Bordes, F. (1955). La stratigraphie de la grotte de Combe-Grenal (Dordogne). Note pre´liminaire. *Bulletin de la Societe Prehistorique Française* 52, p.426–429

Bordes, F. (1961). *Typologie du Paleolithique Ancien et Moyen: Volume 1*. Bordeaux: Delmas.

Bordes, F. (1966). Acheulean cultures in southwest France. In: D. Sen and A.K. Gosh (eds) *Studies in prehistory. Robert Bruce Foote memorial volume*, p.49 – 57. Calcutta: K. L. Mokhopadhyay.

Bordes, F. (1971a). Observations sur l'Acheuléen des grottes en Dordogne. *Munibe* 23(1), p.5 – 23.

Bordes, F. (1971b). Physical evolution and technological evolution in man: a parallelism. *World Archaeology* 3(1), p.1 – 5.

Boreham, S. (2002). The Pleistocene stratigraphy and palaeoenvironments of the Cambridge District. Unpublished Ph.D. thesis. The Open University.

Boreham, S., White, T.S., Bridgland, D.R., Howard, A.J. and White, M.J. (2010). The Quaternary history of the Wash fluvial network, UK. *Proceedings of the Geologists' Association* 121(4), p.393 – 409.

Bosinski G. (1968). *Die mittelpaläolithischen Funde im westlichen Mitteleuropa*. Köln/Graz: Böhlau-Verlag.

Boule, M. and Vallois, H.V. (1957). *Fossil Men: A textbook of human palaeontology*. London: Thames and Hudson.

Bourguignon, L,. Djema, H., Bertran, P., Lahaye, C. and Guibert, P. (2008). Le gisement saalien de Petit-Bost (Neuvic, Dordogne): à l'origine du Moustérien d'Aquitaine? In: J. Jaubert, J.G. Bordes & I. Ortega (eds.), *Les sociétés du Paléolithique dans un grand Sud-Ouest : nouveaux gisements, nouveaux résultats, nouvelles méthodes, séances de la SPF, 24–25 Novembre 2006, Bordeaux*. Bulletin de la Société Préhistorique Française, mémoire XLVII de la SPF, p. 41–56.

Bowen, D.Q., Hughes, S., Sykes, G.A. and Miller, G.H. (1989). Land-sea correlations in the Pleistocene based on isoleucine epimerization in non-marine molluscs. *Nature* 340, p.49 – 51.

Bowen, D.Q., Sykes, G.A., Maddy, D., Bridgland, D.R. and Lewis, S.G. (1995). Aminostratigraphy and amino-acid geochronology of English lowland valleys: the Lower Thames in context. In: D.R. Bridgland, P. Allen, B.A. Haggart (eds), *The Quaternary of the Lower reaches of the Thames. Quaternary Research Association Field Guide*, p.61 – 64. Cambridge: Quaternary Research Association.

Bowen, D.Q. (1999). On the correlation and classification of Quaternary deposits and landsea correlations. In: D.Q. Bowen, (ed.) A revised correlation of Quaternary deposits in the British Isles: 1-9. *Geological Society Special Report 23*.

Boyd, R. and Richerson, P.J. (1985). *Culture and the evolutionary process*. Chicago: Chicago University Press.

Boyd, R. and Richerson P.J. (1996). Why culture is common, but cultural evolution is rare. *Proceedings of the British Academy* 88, p.77–93.

Braun, D.R., Aldeias, V., Archer, W., Arrowsmith, J.R., Baraki, N., Campisano, C.J., Deino, A.L., DiMaggio, E.N., Dupont-Nivet, G., Engda, B. and Feary, D.A. (2019). Earliest known Oldowan artifacts at> 2.58 Ma from Ledi-Geraru, Ethiopia, highlight early technological diversity. *Proceedings of the National Academy of Sciences* 116(24), p.11712-11717.

Brent, J. (1875). On Incised Flints. *The Journal of the Anthropological Institute of Great Britain and Ireland* 4, p.88 – 90.

Breuil, H. (1932a). Le Paléolithique ancien en Europe occidentale et sa chronologie. *Bulletin de la Société préhistorique de France* 29(12), p.570-578.

Breuil, H. (1932b). Les industries a éclats du Paléolithique ancient I: Le Clactonien. *Prehistoire* 1, p.148–157.

Breuil, H. (1934). De l'importance de la solifluxion dans l'étude des terrains quaternaires de la France et de pays voisins. *Revue de Géographie Physique et de Géologie Dynamique* 7(4), p. 269-331.

Briant, R.M., Wenban-Smith, F.F. and Schwenninger, J.L. (2009). Solent river gravels at Barton on Sea, Hampshire. In R.M. Briant, M.R. Bates, R.T. Hosfield, and F.F. Wenban-Smith (eds), *The Quaternary of the Solent Basin and the West Sussex raised beaches: field guide*, p. 161 – 170. Quaternary Research Association.

Briant, R.M., Kilfeather, A.A., Parfitt, S., Penkman, K.E.H., Preece, R.C., Roe, H.M., Schwenninger, J.L., Wenban-Smith, F.F. and Whittaker, J.E. (2012). Integrated chronological control on an archaeologically significant Pleistocene river terrace sequence: the Thames-Medway, eastern Essex, England. *Proceedings of the Geologists' Association* 123(1), p.87 – 108.

Bridgland, D.R. (1988). The Pleistocene fluvial stratigraphy and palaeogeography of Essex. *Proceedings of the Geologists' Association* 99(4), p.291 – 314.

Bridgland, D.R. (1994). *Quaternary of the Thames*. London: Chapman and Hall.

Bridgland, D.R. (1996). Quaternary river terrace deposits as a framework for the Lower Palaeolithic record. In C. Gamble and A.J. Lawson (eds), *The English Palaeolithic Reviewed*, p.24 – 39. Wessex: Trust for Wessex Archaeology.

Bridgland, D.R. (2003). The evolution of the River Medway, SE England, in the context of Quaternary palaeoclimate and the Palaeolithic occupation of NW Europe. *Proceedings of the Geologists' Association* 114(1), p.23 – 48.

Bridgland, D.R. (2006). The Middle and Upper Pleistocene sequence in the Lower Thames: a record of Milankovitch climatic fluctuation and early human occupation of southern Britain: Henry Stopes Memorial Lecture 2004. *Proceedings of the Geologists' Association* 117(3), p.281 – 305.

Bridgland, D.R. (2010). The record from British Quaternary river systems within the context of global fluvial archives. *Journal of Quaternary Science* 25(4), p.433 – 446.

Bridgland, D.R. and Allen, P. (1996). A revised model for terrace formation and its significance for the early Middle Pleistocene terrace aggradations of north-east Essex, England. In C. Turner (ed.), *The Early Middle Pleistocene in Europe,* p. 121 – 134. Rotterdam: Balkema.

Bridgland, D. R. and Harding, P. (1987). Palaeolithic sites in tributary valleys of the Solent river. In: K.E. Barber (ed), *Wessex and the Isle of Wight. Field Guide*, p. 45 – 57. Cambridge: Quaternary Research Association.

Bridgland, D.R. and Harding, P. (1993a). Middle pleistocene thames terrace deposits at Globe Pit, Little Thurrock, and their contained clactonian industry. *Proceedings of the Geologists' Association* 104(4), p.263 – 283.

Bridgland, D.R. and Harding, P. (1993b). Preliminary observations at the Kimbridge Farm Quarry, Dunbridge, Hampshire: early results of a watching brief. *Quaternary Newsletter* 69, p.1–9.

Bridgland, D.R. and Maddy, D. (1995). *River Terraces as Records of Quaternary Climate Oscillation. Programme with Abstracts*, p.37. INQUA XIV: Berlin.

Bridgland, D.R. and Maddy, D. (2002). Global correlation of long Quaternary fluvial sequences: a review of baseline knowledge and possible methods and criteria for establishing a database. *Netherlands Journal of Geosciences* 81, p. 265 – 281.

Bridgland, D.R. and Schreve, D.C. (2001). River terrace formation in synchrony with long-term climatic fluctuation: supporting mammalian evidence from southern Britain. In D. Maddy, M. G. Macklin and J. C. Woodward (eds.), *River basin sediment systems: archives of environmental change*, p.229 – 248. Rotterdam: Balkema.

Bridgland, D.R. and Schreve, D.C. (2004). Quaternary lithostratigraphy and mammalian biostratigraphy of the Lower Thames terrace system, South-East England [Lithostratigraphiequaternaire et biostratigraphie mammalienne du système de terrasses de la basse vallée de laTamise (Sud-Est de l'Angleterre)]. *Quaternaire* 15(1), p.29 – 40.

Bridgland, D.R. and Schreve, D.C. (2009). Implications of new Quaternary uplift models for correlation between the Middle and Upper Thames terrace sequences, UK. *Global and Planetary Change* 68(4), p.346 – 356.

Bridgland, D.R. and Westaway, R. (2008). Climatically controlled river terrace staircases: a worldwide Quaternary phenomenon. *Geomorphology* 98(3-4), p.285 – 315.

Bridgland, D.R. and White, M.J. (2014). Fluvial archives as a framework for the Lower and Middle Palaeolithic: patterns of British artefact distribution and potential chronological implications. *Boreas* 43(2), p.543 – 555.

Bridgland, D.R. and White, M.J. (2015). Chronological variations in handaxes: patterns detected from fluvial archives in north-west Europe. *Journal of Quaternary Science* 30(7), p.623 – 638.

Bridgland, D.R. and White, M.J. (2018). The Farnham river terrace staircase: an optimal record of the Thames Palaeolithic. *Earth Heritage* 49, p.51 – 54.

Bridgland, D.R., Gibbard, P.L. and Preece, R.C. (1990). The geology and significance of the interglacial sediments at Little Oakley, Essex. *Philosophical Transactions of the Royal Society of London B* 328, 307–339.

Bridgland, D.R., Keen, D.H., Schreve, D.C. and White, M.J. (1998a). Quaternary drainage of the Kentish Stour. In J.B. Murton, C.A. Whiteman, M.R. Bates, D.R. Bridgland, A.J. Long, M.B. Roberts and M.P. Walker (eds), *The Quaternary of Kent and Sussex: Field Guide*, p.39 - 41. London: Quaternary Research Association.

Bridgland, D.R., Keen, D.H., Schreve, D.C. and White, M.J. (1998b). Fordwich. In J.B. Murton, C.A. Whiteman, M.R. Bates, D.R. Bridgland, A.J. Long, M.B. Roberts and M.P. Walker (eds), *The Quaternary of Kent and Sussex: Field Guide*, p.41 – 42. London: Quaternary Research Association.

Bridgland, D.R., Keen, D.H., Schreve, D.C. and White, M.J. (1998c). Sturry (TR 174607). In J.B. Murton, C.A. Whiteman, M.R. Bates, D.R. Bridgland, A.J. Long, M.B. Roberts and M.P. Walker (eds), *The Quaternary of Kent and Sussex: Field Guide*, p.42 – 44. London: Quaternary Research Association.

Bridgland, D.R., Keen, D.H., Schreve, D.C. and White, M.J. (1998d). Summary: dating and correlation of the Stour sequence. In J.B. Murton, C.A. Whiteman, M.R. Bates, D.R. Bridgland, A.J. Long, M.B. Roberts and M.P. Walker (eds), *The Quaternary of Kent and Sussex: Field Guide*, p.44 – 46. London: Quaternary Research Association.

Bridgland, D.R., Preece, R.C., Roe, H.M., Tipping, R.M., Coope, G.R., Field, M.H., Robinson, J.E., Schreve, D.C. and Crowe, K. (2001). Middle Pleistocene interglacial deposits at Barling, Essex, UK: evidence for a longer chronology for the Thames terrace sequence. *Journal of Quaternary Science* 16, p.813 – 840.

Bridgland, D.R., Maddy, D. and Bates, M. (2004). River terrace sequences: templates for Quaternary geochronology and marine–terrestrial correlation. *Journal of Quaternary Science* 19(2), p.203 – 218.

Bridgland, D.R., Harding, P., Allen, P., Candy, I., Cherry, C., George, W., Horne, D.J., Keen, D.H., Penkman, K.E.H., Preece, R.C., Rhodes, E.J., Scaife, R., Schreve, D.C., Schwenninger, J., Slipper, I., Ward, G.R., White, M.J., White, T.S. and Whittaker, J.E. (2013). An enhanced record of MIS 9 environments, geochronology and geoarchaeology: data from construction of the High Speed 1 (London–Channel Tunnel) rail-link and other recent investigations at Purfleet, Essex, UK. *Proceedings of the Geologists' Association* 124(3), p.417 – 476.

Bridgland, D.R., Wenban-Smith, F.S., Briant, R.M., White, T.S and Schreve, D.C. (2019). The Thames Terraces in Central London. in D.R. Bridgland, B. Briant, P. Allen, E. Brown and T.S. White (eds.), *The Quaternary fluvial archives of the major English rivers*, p. 89 – 93. Durham: Quaternary Research Association.

Bridgland, D.R. and White, M.J. (2014). Fluvial archives as a framework for the Lower and Middle Palaeolithic: patterns of British artefact distribution and potential chronological implications. *Boreas* 43(2), p.543 – 555.

Bridgland, D.R. and White, M.J. (2015). Chronological variations in handaxes: patterns detected from fluvial archives in north-west Europe. *Journal of Quaternary Science* 30(7), p.623 – 638.

Briggs, D.J., Coope, G.R. and Gilbertson, D.D. (1985). *The chronology and environmental framework of early man in the Upper Thames Valley: a new model (Vol. 137)*. Oxford: BAR.

Bril, B., Roux, V., & Dietrich, G. (2000). Habiletes impliquees dans la taille des perles en roches dure: caracteristiques motrices et cognitives d'une action situee complexe. In V. Roux (ed.), *Les perles de Cambay – Des pratiques techniques aux technosyste´mes de l'Orient ancient* (p. 211 – 329). Editions de la Maison des sciences de l'homme

Bringmans, P., Vermeersch, P., Gullentops, F., Meijs, E., Groenendijk, A., Warrimont, J., and Cordy, J. (2004). Middle Palaeolithic Veldwezelt-Hezerwater (Limburg, Belgium). *Excursion Guide (Neanderthals in Europe Colloquium)*, p. 1 – 11.

Brown, B. (n.d.). Unpublished document: Basil Brown. Basil Brown Archive. Accessed through heritage.suffolk.gov.uk, 26.01.2020.

Brown, J.A. (1895a). Notes on the high-level river drift between Hanwell and Iver. *Proceedings of the Geologists' Association* 14, p.153 – 173.

Brown, J.A. (1895b). Excursion to Hanwell, Dawley, and West Drayton. *Proceedings of the Geologists' Association* 14, p.118 – 120.

Brown, A.G., Basell, L.S., Robinson, S. and Burdge, G.C. (2013). Site distribution at the edge of the palaeolithic world: a nutritional niche approach. *PloS One* 8(12), e81476.

Brumm, A., Pope, M., Leroyer, M. and Emery, K. (2019). Hominin evolution and stone tool scavenging and reuse in the Lower Palaeolithic. In K.A. Overmann and F.L. Coolidge (eds), *Squeezing Minds from Stones*, p.149 – 178. Oxford: Oxford University Press.

Burchell, J.P.T. (1924). The Gravels at Reculver, Kent. *Proceedings of the Prehistoric Society of East Anglia* 4(2), p.203 – 210.

Burdukiewicz, J.M. (2000). The backed biface assemblages of East Central Europe. *BAR International Series* 850, p.155 – 165.

Burkitt, M.C., Paterson, T.T. and Mogridge, C.J. (1939). The Lower Palaeolithic industries near Warsash, Hampshire. *Proceedings of the Prehistoric Society* 5, p. 39–50.

Burriss, R.P. (2009). Symmetry is sexy: reply to Hodgson's 'Symmetry and humans'. *Antiquity* 83(322), p.1170 – 1175.

Bury, H. (1919). Excursion to Farnham: Saturday, June 28th, 1919. *Proceedings of the Geologists' Association* 30(3), p.148 – 149.

Bynoe, R., Ashton, N.M., Grimmer, T., Hoare, P., Leonard, J., Lewis, S.G., Nicholas, D. and Parfitt, S. (2021). Coastal curios? An analysis of *ex situ* beach finds for mapping new Palaeolithic sites at Happisburgh, UK. *Journal of Quaternary Science* 36(2), p.191 – 210.

Cahen, D., Haesaerts, P., Szabo, B.J., Van Neer, W. and Wanet, P. (1984). An early Middle Palaeolithic site at Mesvin IV (Mons, Belgium). Its significance for stratigraphy and palaeontology. *Bulletin de l'Institut Royal de Sciences naturelles de Belgique* 31, p. 1 – 20.

Callow, P. (1976). *British and French handaxe series*. Unpublished doctoral dissertation, University of Cambridge.

Candy, I., Schreve, D.C., Sherriff, J. and Tye, G.J. (2014). Marine Isotope Stage 11: Palaeoclimates, palaeoenvironments and its role as an analogue for the current interglacial. *Earth Science Reviews* 128, p.18 – 51.

Carmignani, L., Moncel, M.H., Fernandes, P. and Wilson, L. (2017). Technological variability during the Early Middle Palaeolithic in Western Europe. Reduction systems and predetermined products at the Bau de l'Aubesier and Payre (South-East France). *PloS one* 12(6), p.e0178550.

Chambers, J.C. (2005). Like a rolling stone? The identification of fluvial transportation damage signatures on secondary context bifaces. *Lithics* 24, p.57 – 65.

Chambers, J.C., and Hosfield, R.T. (2013). Chapter 10. Taphonomy of the Broom Artefact Assemblage. In R. Hosfield and C.P. Green (eds.), *Quaternary history and palaeolithic archaeology in the Axe Valley at Broom, South West England,* p.244 - 261. Oxford: Oxbow.

Chaussé, C. 2003. *Les nappes alluviales de la basse vallée de l'Yonne, approche géométrique et chronostratigraphique; l'apport de l'étude de la Nappe de Soucy à la compréhension des occupations du Paléolithique inférieur de Soucy*. Unpublished doctoral dissertation, University of Lille.

Clark, J.G.D. (1937). Note of discoveries at Southacre by Mr. J.E. Sainty. *Proceedings of the Prehistoric Society* 3, p.438.

Clark, J.G.D. (1968). *World prehistory: a new outline*. Cambridge: Cambridge University Press.

Clarke, D. (1973). Archaeology: the loss of innocence. *Antiquity* 47(185), p.6 – 18.

Clarke, W.G. (1906). The classification of Norfolk flint implements II. Palaeolithic. *Transactions of the Norfolk and Norwich Naturalists' Society* 8, p.220 – 222.

Cliquet, D. (2013). Les occupations paléolithiques en Normandie dans leur contexte chronostratigraphique: bribes archéologiques. *Quaternaire. Revue de l'Association française pour l'étude du Quaternaire* 24(3), p.303 – 314.

Cliquet, D. and Lautridou, J.P. (2009). Les occupations humaines du Pléistocène moyen de Normandie dans leur cadre environnemental. Quaternaire. *Revue de l'Association française pour l'étude du Quaternaire* 20(3), p.305 – 320.

Cliquet D., Lautridou J.-P., Antoine P., Balescu S., Lamothe M., Leroyer M., Limondin - Lozouet N. and Mercier N. (2006). The old loess of Saint-Pierre-les-Elbeuf (Seine-Maritime). In J.-P Lautridou., D. Cliquet & J.-P. Coutard (eds.), *AFEQ Excursion Guidebook*, p. 1 – 24, 25-27 May 2006.

Cliquet, D., Lautridou, J.P., Antoine, P., Lamothe, M., Leroyer, M., Limondin-Lozouet, N. and Mercier, N. (2009). La séquence loessique de Saint-Pierre-lès-Elbeuf (Normandie, France): nouvelles données archéologiques, géochronologiques et paléontologiques. *Quaternaire. Revue de l'Association française pour l'étude du Quaternaire* 20(3), p.321 – 343.

Cockburn, J.S., King, H.P.F., McDonnell, K.G.T. (1969). Archaeology: The Lower Palaeolithic Age. In J.S. Cockburn, H.P.F. King and K.G.T. McDonnell (eds), *A History of the County of Middlesex: Volume 1, Physique, Archaeology, Domesday, Ecclesiastical Organization, the Jews, Religious Houses, Education of Working Classes To 1870, Private Education From Sixteenth Century*, p.11 – 21. URL: http://www.british-history.ac.uk/vch/middx/vol1/pp11-21, accessed on March 31st 2021.

Cole, J. (2012). The identity model: a method to access visual display within the Palaeolithic. *Human Origins* 1, p.24 – 40.

Cole, J. (2014). Hominin language development: a new method of archaeological assessment. *Biosemiotics* 8, p.67 – 90.

Cole, J. (2015). Examining the presence of symmetry within Acheulean handaxes: a case study in the British Palaeolithic. *Cambridge Archaeological Journal* 25(4), p.713 – 732.

Coleman, A. (1952). Some aspects of the development of the Lower Stour, Kent. *Proceedings of the Geologists Association* 63, p.63 – 86.

Coleman, A. (1954). The relief and drainage evolution of the Blean. *Proceedings of the Geologists Association* 65, p.52 – 63.

Collcutt, S.N., Bridgland, D.R., Gamble, C.S. and Newbury, M. (1988). *The Proposed Extraction of Hoggin and Sand at a site on Kimbridge Farm, Kimbridge, Hampshire. Evaluation of the Pleistocene Contexts and their Archaeological Implications*. Unpublished report by Oxford Archaeological Associates Ltd., Oxford.

Collins, D. (1976). Palaeolithic and Mesolithic. In D. Collins, J. MacDonald, J. Barrett, R. Canham, R. Merrifield, J. Hurst (eds), *The Archaeology of the London area: Current knowledge and problems*, p. 1 – 19. Penzance: Wordens of Cornwall.

Collins, D. (1978). *Early Man in West Middlesex*. London: HMSO.

Commont, V. (1908). Les industries de l'ancien Saint-Achuel. *L'Anthropologie* 19, p.527–572.

Connet, N., Soriano, S., Bertran, P., Lhomme, V. and Debenham, N. (2020). A 400,000 years old milestone of the Acheulian technocomplex in Central-Western France at Londigny (Charente). *Journal of Archaeological Science: Reports* 30, p.102225.

Conway, B. (1996). Bifaces in a Clactonian context at Little Thurrock, Grays, Essex. *Lithics* 16, p.41 – 46.

Conway, B. and Waechter, J.D.A. (1977). Barnfield Pit, Swanscombe. In R. Shepherd-Thorn and J.J. Wymer (eds), *South East England and the Thames Valley*, *X INQUA Congress Excursion Guide*, p. 38 – 44. Norwich: Geoabstracts.

Conway, B., McNabb, J., Ashton N, (eds). (1996). *Excavations at Barnfield Pit, Swanscombe 1968-1972*. London: British Museum.

Cook, W.H. and Killick, J.R. (1924). On the discovery of a flint-working site of Palaeolithic date in the Medway Valley at Rochester, Kent, with notes on the drift stages of the Medway. *Proceedings of the Prehistoric Society of East Anglia* 4, p.133–149.

Corbey, R., Jagich, A., Vaesen, K. and Collard, M. (2016). The Acheulean handaxe: More like a bird's song than a Beatles' tune? *Evolutionary Anthropology: Issues, News, and Reviews* 25(1), p.6 – 19.

Costa, A. G. (2010). A geometric morphometric assessment of plan shape in bone and stone acheulean bifaces from the Middle Pleistocene site of Castel di Guido, Latium, Italy. In S. Lycett and P. Chauhan (eds), *New Perspectives on Old Stones: Analytical Approaches to Paleolithic Technologies,* p. 23–41. New York: Springer-Verlag.

Couzens, R.A. (2012). *An Analysis of the Symmetry of Large Cutting Tools Within the South African Acheulean*. Unpublished PhD thesis. Faculty of Science, University of the Witwatersrand, Johannesburg.

Cranshaw, S. (1983). *Handaxes and cleavers: selected English Acheulian industries (Vol. 1)*. Oxford: BAR.

Crompton, R.H. and Gowlett, J.A. (1993). Allometry and multidimensional form in Acheulean bifaces from Kilombe, Kenya. *Journal of Human Evolution* 25(3), p.175 – 199.

Cruse, J. (1987). Further investigations of the Acheulian site at Cuxton. *Archaeologia Cantiana* 56, p.39–81.

Currant, A.P. (1986). Man and Quaternary interglacial faunas of Britain. In S.N. Collcutt (ed), *The Palaeolithic of Britain and its Nearest Neighbours*, p.50 – 52. Sheffield: University of Sheffield.

Currant, A.P. (1989). The Quaternary origins of the modern British mammal fauna. *Biological Journal of the Linnean Society* 38, p. 23 – 30.

Currant, A.P. and Jacobi, R.M. (2001). A formal mammalian biostratigraphy for the Late Pleistocene of Britain. *Quaternary Science Reviews* 20, p.1707–1716.

Currie, G. (2009). Art for art's sake in the Old Stone Age. *Postgraduate Journal of Aesthetics* 6(1), p.1 – 23.

Cutler, H.J. (2015). *Understanding Late Middle Palaeolithic Neandertal Landscape-use during Short-Term Occupations in Britain*. Unpublished doctoral dissertation, University of Cambridge.

Cutler, K.B., Edwards, L.R., Taylor, F.W., Cheng, H., Adkins, J., Gallup, C.D., Cutler, P.M., Burr, G.S. and Bloom, A.L. (2003). Rapid sea-level fall and deep-ocean temperature change since the last interglacial period. *Earth and Planetary Science Letters* 206, p.253 – 271.

Dale, L.C. (2020a). An analysis of the Furze Platt handaxes at the Royal Ontario Museum, Toronto. *Lithics* 40, p.65 – 78.

Dale, L.C. (2020b). An analysis of the Furze Platt handaxes at the Royal Ontario Museum, Toronto, Canada. *PAST, the newsletter of the Prehistoric Society* 96, p.13 – 14.

Dale, L.C., Rawlinson, A.A., Bridgland, D.R, and White, M.J. (2021). The value of English geoconservation sites in understanding historical collections of lower and middle palaeolithic artefacts. *Proceedings of the Geologists' Association*, https://doi.org/10.1016/j.pgeola.2021.06.008

Dale, W. (1896). The Palaeolithic implements of the Southampton gravels. *Papers and Proceedings of the Hampshire Field Club* 3, p.261–264.

Dale, W. (1912). On the implement-bearing gravel beds of the lower valley of the test. *Proceedings of the Society of Antiquaries, London Series* 2(24), p.108–111.

Dale, W. (1918). Report as local secretary for Hampshire. *Proceedings of the Society of Antiquaries, London Series* 2(30), p.20–23.

Darby, S. (1909). *Chapters in the History of Cookham, Berkshire*. Privately printed.

Davis R.J. (2013). *Palaeolithic Archaeology of the Solent River: Human Settlement, History and Technology*. Unpublished PhD thesis, University of Reading.

Davis, R.J. (2014). Concerning the earliest Acheulean occupation of Britain: the geological context of a handaxe assemblage from Foxholes, Bournemouth, southern England. *Lithics* 35, p.33 – 39.

Davis, R. and Ashton, N. (2019). Landscapes, environments and societies: The development of culture in Lower Palaeolithic Europe. *Journal of Anthropological Archaeology* 56, p.101107.

Davis, R. J., Hatch, M., Ashton, N., Hosfield, R. and Lewis, S.G. (2016). The Palaeolithic record of Warsash, Hampshire, UK: implications for late Lower and early Middle Palaeolithic occupation history of Southern Britain. *Proceedings of the Geologists' Association* 127(5), p.558 - 574.

Davis, R.J., Lewis, S.G., Ashton, N., Parfitt, S.A., Hatch, M.T. and Hoare, P.G. (2017). The early Palaeolithic archaeology of the Breckland: current understanding and directions for future research. *The Journal of Breckland Studies* 1, p.28 – 44.

Davis, R., Ashton, N., Hatch, M., Hoare, P.G. and Lewis, S.G. (2021a). Palaeolithic archaeology of the Bytham River: human occupation of Britain during the early Middle Pleistocene and its European context. *Journal of Quaternary Science* 36(4), p.526 – 546.

Davis, R., Ashton, N., Hatch, M., Hosfield, R. and Lewis, S.G. (2021b). Lower and Early Middle Palaeolithic of Southern Britain: the Evidence from the River Test. *Journal of Paleolithic Archaeology* 4(3), p.1 – 50.

De Groote, I., Lewis, M. and Stringer, C. (2018). Prehistory of the British Isles: A tale of coming and going. *Bulletins et Mémoires de la Société d'Anthropologie de Paris* 30(1-2), p.1 – 13.

de la Torre, I. (2016). The origins of the Acheulean: past and present perspectives on a major transition in human evolution. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1698), p.20150245.

de Mortillet, G. (1873). Classification des diverse période d'Âge de la Pierre. Compte Rendu du Congrès Internationale d'Anthropologie et d'Archéologie Préhistoriques, 6me Session, Bruxelles, 1872, p.432 – 444. Brussels: Weissenbruch.

de Mortillet, G., and de Mortillet, A. (1881). *Musée Préhistorique*. Paris: Reinwald.

Dean, D., Hublin, J.J., Holloway, R. and Ziegler, R. (1998). On the phylogenetic position of the pre-Neandertal specimen from Reilingen, Germany. *Journal of Human Evolution* 34(5), p.485 – 508.

Debénath, A., and Dibble, H.L. (1993). *Handbook of Paleolithic Typology: Lower and Middle Paleolithic of Europe*. Philadelphia: University of Pennsylvania Press.

Delagnes A. and Meignen, L. (2006). Diversity of lithic production systems during the Middle Paleolithic in France. In E. Hovers & S.L. Kuhn (eds.), *Transitions before the transition,* p. 85 – 107. Boston, MA.: Springer.

Delagnes, A. and Ropars, A. (1996). *Paléolithique moyen en Pays de Caux (Haute-Normandie). Document d'Archéologie Française*. Paris: Maison des Sciences de l'Homme.

Delpech, F., Geneste, J.M., Rigaud, J.P., Texier, J.P. (1995). Les industries antérieures à la dernière glaciation en Aquitaine septentrionale : chronologie, paléoenvironnements, technologie, typologie et économie de subsistance. *Les industries à pointes foliacées d'Europe centrale, Supplément à Paléo, Les Eyzies: SAMRA*, p.133 - 164.

Delpiano, D., Zupancich, A. and Peresani, M. (2019). Innovative Neanderthals: Results from an integrated analytical approach applied to backed stone tools. *Journal of Archaeological Science* 110, p.105011.

Dennell, R. (2016). Life without the Movius line: the structure of the east and Southeast Asian Early Palaeolithic. *Quaternary International* 400, p.14 – 22.

Dennell, R.W., Martinón-Torres, M. and de Castro, J.M.B. (2011). Hominin variability, climatic instability and population demography in Middle Pleistocene Europe. *Quaternary Science Reviews* 30(11-12), p.1511 – 1524.

Dewey, H. and Smith, R.A. (1925). Flints from the Sturry gravels, Kent. *Archaeologia* 74, p.117–136.

Dibble, H.L. (1987). Reduction sequences in the manufacture of Mousterian implements of France. In O. Soffer (ed), *The Pleistocene Old World: Regional Perspectives*, p. 33-45. Boston: Springer.

Dines, H.G., Holmes, S.C. and Robbie, J.A. (1954). Geology of the Country around Chatham. London: HMSO.

D'Olier, B. (1975). Some aspects of late Pleistocene-Holocene drainage of the River Thames in the eastern part of the London Basin. *Philosophical Transactions of the Royal Society of London* A279, p.269 – 277.

Duigan, S.L. and Sandford, K.S. (1956). Interglacial plant remains from the Wolvercote Channel, Oxford. *Quarterly Journal of the Geological Society* 112(1-4), p.363 – 372.

Dunbar, R.I. (1998). The social brain hypothesis. *Evolutionary Anthropology* 6, p.178–190.

Dunbar, R.I. (2003). The social brain: mind, language, and society in evolutionary perspective. *Annual Review of Anthropology* 32(1), p.163 – 181.

Egberts, E. (2017). *The palaeolithic of the Avon valley: a geoarchaeological approach to the hominin colonisation of Britain*. Unpublished doctoral dissertation, Bournemouth University.

Egberts, E., Basell, L.S. and Toms, P.S. (2019). Quaternary landscape change and evidence of hominin presence in the Avon valley. In D.R. Bridgland, R.M. Briant, P. Allen, E.J. Brown and T.S. White (eds), *The Quaternary fluvial archives of the major English rivers: Field Guide*, p. 151 – 158. London: Quaternary Research Association.

Egberts, E., Basell, L.S., Welham, K., Brown, A.G. and Toms, P.S. (2020). Pleistocene landscape evolution in the Avon valley, southern Britain: Optical dating of terrace formation and Palaeolithic archaeology. *Proceedings of the Geologists' Association* 131(2), p.121 – 137.

Ellison, R.A., Woods, M.A., Allen, D.J., Forster, A., Pharaoh, T.C. and King, C. (2004). *Geology of London (New Series sheets 256 (London), 257 (Romford), 270 (South London), 271 (Dartford))*. Memoir of the Geological Survey. London: HMSO.

Emery, K. (2010). *A re-examination of variability in handaxe form in the British Palaeolithic*. Unpublished doctoral dissertation, University College London.

Evans, J. (1872). *The ancient stone implements, weapons and ornaments of Great Britain*. London: Longmans.

Falguères, C., Bahain, J.J. and Saleki, H. (1997). U-series and ESR dating of teeth from Acheulian and Mousterian levels at La Micoque (Dordogne, France). *Journal of archaeological science* 24(6), p.537 - 545.

Féblot-Augustins, J. (1993). Mobility strategies in the late Middle Palaeolithic of central Europe and western Europe: elements of stability and variability. *Journal of anthropological archaeology* 12(3), p.211 – 265.

Féblot-Augustins, J. (1999). La mobilité des groupes paléolithiques. *Bulletins et Mémoires de la Société d'anthropologie de Paris* 11(3), p.219 – 260.

Field, D., Nicolaysen, P. and Cotton, J. (1999). The Palaeolithic sites at Limpsfield, Surrey: an analysis of the artefacts collected by A.M. Bell. *Surrey Archaeological Collections* 86, p.1–32.

Flower, J.W. (1867). On some flint implements lately found in the valley of the Little Ouse River at Thetford, Norfolk. *Quarterly Journal of the Geological Society of London* 23, p.45–53.

Flower, J.W. (1869). On some recent discoveries of flint implements of the drift of Norfolk and Suffolk, with observations on the theories accounting for their distribution. *Quarterly Journal of the Geological Society of London* 25, p.449–460.

Foley, R. (1981). Off-site archaeology: an alternative approach for the short-sited. In I. Hodder, G. Isaac and N. Hammond (eds), *Pattern of the past: studies in the honour of David Clarke*, p.157 – 185. Cambridge: Cambridge University Press.

Foulds, F.W. (2010). Investigating the individual? An experimental approach through lithic refitting. *Lithics* 31, p.1 – 14.

Foulds, F.W., Shuttleworth, A., Sinclair, A., Alsharekh, A.M., Al Ghamdi, S., Inglis, R.H. and Bailey, G.N. (2017). A large handaxe from Wadi Dabsa and early hominin adaptations within the Arabian Peninsula. *Antiquity* 91(360), p.1421 – 1434.

Fox, W. (n.d.). *An Analysis of the R.O.M Collection of Lower Palaeolithic Implements, Furze Platt,* *Maidenhead, Berkshire, England*. Unpublished undergraduate dissertation.

Freckleton, R.P., Harvey, P.H. and Pagel, M. (2003). Bergmann's rule and body size in mammals. *The American Naturalist* 161(5), p.821 – 825.

Frere, J. (1800). Account of flint weapons discovered at Hoxne in Suffolk. *Archaeologia* 13, p.204–205.

Galán, A.B. and Domínguez-Rodrigo, M. (2014). Testing the efficiency of simple flakes, retouched flakes and small handaxes during butchery. *Archaeometry* 56(6), p.1054 – 1074.

Galway-Witham, J., Cole, J. and Stringer, C. (2019). Aspects of human physical and behavioural evolution during the last 1 million years. *Journal of Quaternary Science* 34(6), p.355 – 378.

Gamble, C. (1999). *The palaeolithic societies of Europe*. Cambridge: Cambridge University Press.

Gamble, C. (2002). *Human evolution: the last one million years*. Abingdon: Routledge.

Gamble, C. (2009). Human Display and Dispersal: A Case Study from Biotidal Britain in the Middle and Upper Pleistocene. *Evolutionary Anthropology* 18, p. 144–156

Gamble, C., and ApSimon, A.M. (1986). Red Barns, Portchester. In S. Collcutt (ed) *The Palaeolithic of Britain and its Nearest Neighbours: Recent Trends*, p. 8 – 12. Sheffield: J.R. Collis Publications.

Gamble, C., and Roebroeks, W. (1999). The Middle Palaeolithic: a point of inflection. In W. Roebroeks and C. Gamble (eds.), *The Middle Palaeolithic occupation of Europe*. Leiden: University Press.

Gao, C. (1997). *Sedimentology and stratigraphy of the River Great Ouse, southern England*. Unpublished doctoral dissertation, University of Cambridge.

García-Medrano, P., Ollé, A., Ashton, N. and Roberts, M.B. (2019). The mental template in handaxe manufacture: new insights into Acheulean lithic technological behavior at Boxgrove, Sussex, UK. *Journal of Archaeological Method and Theory* 26(1), p.396 – 422.

García-Medrano, P., Maldonado-Garrido, E., Ashton, N. and Ollé, A. (2020a). Objectifying processes: The use of geometric morphometrics and multivariate analyses on Acheulean tools. *Journal of Lithic Studies* 7(1). https://doi.org/10.2218/jls.4327

García-Medrano, P., Ashton, N., Moncel, M.H. and Ollé, A. (2020). The WEAP method: A new age in the analysis of the Acheulean Handaxes. *Journal of Paleolithic Archaeology* 3(4), p.756 – 793.

Gibbard, P.L. (1977). Pleistocene history of the Vale of St. Albans. *Philosophical Transactions of the Royal Society of London* B280, p.445 – 483.

Gibbard, P.L. (1979). Middle Pleistocene drainage in the Thames Valley. Geological Magazine 116, p.35 – 44.

Gibbard, P.L. (1995). *Pleistocene history of the Lower Thames valley*. Cambridge: Cambridge University Press.

Gibbard, P.L. and Clark, C.D. (2011). Pleistocene glaciation limits in Great Britain. *Developments in Quaternary Sciences* 15, p.75 – 93.

Gibbard, P.L., Wintle, A.G. and Catt, J.A. (1987). Age and origin of clayey silt 'brickearth' in west London, England. *Journal of Quaternary Science* 2(1), p.3 – 9.

Gibbard, P.L., West, R.G., Pasanen, A., Wymer, J.J., Boreham, S., Cohen, K.M. and Rolfe, C. (2008). Pleistocene geology of the Palaeolithic sequence at Redhill, Thetford, Norfolk, England. *Proceedings of the Geologists' Association* 119(2), p.175 – 192.

Goren-Inbar, N., 2011. Behavioral and cultural origins of Neanderthals: a Levantine perspective. In S. Condemi and G.C. Weniger (eds.), *Continuity and Discontinuity in the Peopling of Europe*, p. 89 – 100. Dordrecht: Springer.

Goren-Inbar, N., Sharon, G. (2006). Invisible handaxes and visible Acheulean biface technology at Gesher Benot Ya'aqov, Israel. In N. Goren-Inbar and G. Sharon (Eds), *Axe Age: Acheulean Tool-making From Quarry to Discard*, p.111 – 136. London: Equinox.

Gouédo, J.M. (1999) Le technocomplexe Micoquien en Europe de l'Ouest et Centrale; exemples de trois gisements du sud-est du bassin parisien, Vinneuf et Champlost (Yonne), Verrières-le-Buisson (Essonne). Unpublished doctoral dissertation, Université des Sciences et Technologies de Lille, Lille (France).

Gowlett, J. A. (2006a). The elements of design form in Acheulian bifaces: modes, modalities, rules and language. In N. Goren-Inbar and G. Sharon (eds.), *Axe Age: Acheulian tool-making from Quarry to discard*, p. 1 – 20. London: Equinox.

Gowlett, J.A. (2006b). The early settlement of northern Europe: fire history in the context of climate change and the social brain. *Comptes Rendus Palevol* 5(1-2), p.299 – 310.

Grahmann, R. (1952). *Urgeschichte der Menschheit. Einfuhrung in die Abstammungs- und Kulturgeschichte der Menschheit*. Stuttgart: W. Kohlhammer.

Green, H.S. (1984). *Pontnewydd Cave: a lower Palaeolithic hominid site in Wales: the first report (Vol. 1)*. Stroud: Sutton Publishing Limited.

Green, C.P. (1988). The Palaeolithic site at Broom, Dorset, 1932-41: from the record of C.E. Beam, Esq., F.S.A. *Proceedings of the Geologists Association* 99, p.173 – 180.

Green, C.P., Gibbard, P.L. and Bishop, B.J. (2004). Stoke Newington: geoarchaeology of the Palaeolithic 'floor'. *Proceedings of the Geologists' Association* 115(3), p.193 – 207.

Green, C.P., Branch, N.P., Coope, G.R., Field, M.H., Keen, D.H., Wells, J.M., Schwenninger, J.L., Preece, R.C., Schreve, D.C., Canti, M.G. and Gleed-Owen, C.P. (2006). Marine Isotope Stage 9 environments of fluvial deposits at Hackney, north London, UK. *Quaternary Science Reviews* 25(1-2), p.89 – 113.

Green, C.P., Hosfield, R.T., Stephens, N., and Shakesby, R.A. (2013). Chapter 4. New Investigations at Broom. In R. Hosfield and C.P. Green (eds.), *Quaternary history and palaeolithic archaeology in the Axe Valley at Broom, South West England,* p.84 – 149. Oxford: Oxbow.

Greenhill, J.E. (1884). The implementiferous gravels of north-east London. *Proceedings of the Geologists' Association* 8(6), p.336 – 343.

Grosman, L., Sharon, G., Goldman-Neuman, T., Smikt, O. and Smilansky, U. (2011). Studying post depositional damage on Acheulian bifaces using 3-D scanning. *Journal of Human Evolution* 60(4), p. 398 – 406.

Gupta, S., Collier, J.S., Palmer-Felgate, A. and Potter, G. (2007). Catastrophic flooding origin of shelf valley systems in the English Channel. *Nature* 448, p.342 – 345.

Hardaker, T. (2001). New Lower Palaeolithic Finds from the Upper Thames. In S. Milliken and J. Cook (eds), *A very Remote Period Indeed: Papers on the Palaeolithic presented to Derek Roe*, p. 180 – 198. Oxford: Oxbow.

Hardaker, T. (2003). Some thoughts on a stray Upper Thames handaxe. *Lithics* 24, p.21 - 31.

Hardaker, T. (2012). The artefacts from the present land surface at the Palaeolithic site of Warren Hill, Suffolk, England. *Proceedings of the Geologists' Association* 123(5), p.692 – 713.

Hardaker, T. and Dunn, S. (2005). The Flip Test-a new statistical measure for quantifying symmetry in stone tools. *Antiquity* 79 (306).

Harding, P. and Bridgland, D. R. (1998). Pleistocene deposits and palaeolithic implements at Godolphin School, Milford Hill, Salisbury. *Wiltshire Archaeological and Natural History Magazine* 91, p. 1–10.

Harding, P. and Bridgland, D.R. (1999). Results of geological and archaeological observations at Switchback Road Pit, Maidenhead, Berkshire. *Proceedings of the Geologists' Association* 110(4), p.311 – 320.

Harding, P. and Bridgland, D.R. (2014). Lower and Middle Palaeolithic Artefacts and Other Results from River Gravels at Dunbridge: Important New Discoveries. *Hampshire Studies* 69(1), p.1 – 15.

Harding, P., Bridgland, D., Keen, D.H. and Rogerson, R. (1991a). A Palaeolithic site rediscovered at Biddenham, Bedfordshire. *Bedfordshire Archaeology* 19, p.87 – 90.

Harding, P., Bridgland, D.R., Madgett, P.A. and Rose, J. (1991b). Recent investigations of Pleistocene sediments near Maidenhead, Berkshire, and their archaeological content. *Proceedings of the Geologists' Association* 102(1), p.25 – 53.

Harding, P., Bridgland, D.R., Allen, P., Bradley, P., Grant, M.J., Peat, D., Schwenninger, J.L., Scott, R., Westaway, R. and White, T.S. (2012). Chronology of the Lower and Middle Palaeolithic in NW Europe: developer-funded investigations at Dunbridge, Hampshire, southern England. *Proceedings of the Geologists' Association* 123(4), p.584 – 607.

Hare, F.K. (1947). The geomorphology of a part of the Middle Thames. *Proceedings of the Geologists' Association* 58(4), p.294 – 339.

Harmand, S., Lewis, J.E., Feibel, C.S., Lepre, C.J., Prat, S., Lenoble, A., Boës, X., Quinn, R.L., Brenet, M., Arroyo, A., and Taylor, N. (2015). 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya. *Nature* 521(7552), p.310 – 315.

Harris, C.R., Ashton, N. and Lewis, S.G. (2019). From site to museum: a critical assessment of collection history on the formation and interpretation of the British Early Palaeolithic record. *Journal of Palaeolithic Archaeology* 2(1), p.1 – 25.

Hatch, M., Davis, R.J., Lewis, S.G., Ashton, N., Briant, R.M. and Lukas, S. (2017). The stratigraphy and chronology of the fluvial sediments at Warsash, UK: implications for the Palaeolithic archaeology of the River Test. *Proceedings of the Geologists' Association* 128(2), p.198 – 221.

Hérisson, D. and Goval, E. (2013). Du Paléolithique inférieur au début du Paléolithique supérieur dans le Nord de la France: lumière sur les premières découvertes du Canal Seine-Nord Europe. *Notae Praehistoricae* 33, p.91 – 104.

Hérisson, D., Coutard, S., Goval, E., Locht, J.L., Antoine, P., Chantreau, Y. and Debenham, N. (2016a). A new key-site for the end of Lower Palaeolithic and the onset of Middle Palaeolithic at Etricourt-Manancourt (Somme, France). *Quaternary International* 409, p.73 – 91.

Hérisson, D., Brenet, M., Cliquet, D., Moncel, M-H., Richter, J., Scott, B., Van Baelen, A., Di Modica, K., De Loecker, D., Ashton, N., Bourguignon, L., Delagnes, A., Faivre, J-P., Folgado-Lopez, M., Locht, J-L., Pope, M., Raynal, J-P., Roebroeks, W., Santagata, C., Turq, A., Van Peer, P. (2016b) The emergence of the Middle Palaeolithic in northwestern Europe and its southern fringes. *Quaternary International* 411, p.233–283

Hester, T.R., Spence, R.L., Busby, C. and Bard, J. (1976). Butchering a deer with obsidian tools. *Contributions of the University of California Archaeological Research Facility* 33, p.45–56.

Hodgson, D. (2009). Symmetry and humans: reply to Mithen's 'Sexy Handaxe Theory'. *Antiquity* 83(319), p.195 – 198.

Hodgson, D. (2015). The symmetry of Acheulean handaxes and cognitive evolution. *Journal of Archaeological Science: Reports* 2, p.204 – 208.

Hoggard, C.S., McNabb, J. and Cole, J.N. (2019). The application of elliptic Fourier analysis in understanding biface shape and symmetry through the British Acheulean. *Journal of Paleolithic Archaeology* 2(2), p.115 – 133.

Hollin, J.T. (1977). Thames interglacial sites, Ipswichian sea levels and Antarctic ice surges. *Boreas* 6(1), p.33 – 52.

Holloway, R.L. (1969). Culture: a human domain. *Current Anthropology* 10(4.2), p.395 – 412.

Holmes, P., Rose, J., Lee, J.R., Barendregt, R., Candy, I., Riding, J.B. and Lewis, M. (2018). The Middle Pleistocene terraces of the central Waveney valley, Earsham, south Norfolk, UK. *Proceedings of the Geologists' Association* 129(1), p.70 – 88.

Hopkinson, T. (2007). The transition from the Lower to the Middle Palaeolithic in Europe and the incorporation of difference. *Antiquity* 81(312), p.294 – 307.

Hopkinson, T. and White, M.J. (2004). The Acheulean and the handaxe: structure and agency in the Palaeolithic. in C. Gamble (ed.), *The Individual Hominid in Context*, p. 30 – 45. Abingdon: Routledge.

Hosfield, R.T. (2009). The unsung heroes. *Lithics* 30, p.1 – 16.

Hosfield, R.T. (2011a). Rolling stones: understanding river-rolled Palaeolithic artifact assemblages. *Geological Society of America Special Papers* 476, p.37 – 52.

Hosfield, R.T. (2011b). The British Lower Palaeolithic of the Early Middle Pleistocene. *Quaternary Science Reviews* 30(11-12), p.1486 – 1510.

Hosfield, R.T. and Chambers, J.C. (2004). Flake modifications during fluvial transportation: three cautionary tales. *Lithics* 24, p.57 – 65.

Hosfield, R.T. and Chambers, J.C. (2005). Pleistocene geochronologies for fluvial sedimentary sequences: an archaeologist's perspective. *Journal of Quaternary Science: Published for the Quaternary Research Association* 20(3), p.285 – 296.

Hosfield, R.T. and Chambers, J.C. (2009). Genuine diversity? The Broom biface assemblage. *Proceedings of the Prehistoric Society* 75, p.65 – 100.

Hosfield, R.T. and Cole, J., 2018. Early hominins in north-west Europe: a punctuated long chronology?. *Quaternary Science Reviews* 190, p.148 – 160.

Hosfield, R.T. and Green, C.P. (2013). *Quaternary history and palaeolithic archaeology in the Axe Valley at Broom, South West England*. Oxford: Oxbow.

Hosfield, R.T., Wenban-Smith, F. F. and Grant, M. J. (2009). Palaeolithic and Mesolithic archaeology of the Solent Basin and western Sussex region: an overview. In R. Briant, M. Bates, R.T. Hosfield and F.F. Wenban-Smith (eds) *The Quaternary of the Solent Basin and West Sussex Raised Beaches. Field Guide*, p. 42 – 59. London: Quaternary Research Association.

Hosfield, R.T., Marshall, G.D., Chambers, J.C., and Davis, R.J. (2013a). Chapter 8. The Broom Artefact Assemblage. In R. Hosfield and C.P. Green (eds.), *Quaternary history and palaeolithic archaeology in the Axe Valley at Broom, South West England,* p.173 – 216. Oxford: Oxbow.

Hosfield, R.T., Marshall, G.D., and Chambers, J.C. (2013b). Chapter 9. Typology and Technology of the Broom Bifaces. In R. Hosfield and C.P. Green (eds.), *Quaternary history and palaeolithic archaeology in the Axe Valley at Broom, South West England,* p.217 – 244. Oxford: Oxbow.

Hosfield, R.T., Marshall, G.D., and Chambers, J.C. (2013c). Chapter 11. Interpreting the Broom Artefacts. In R. Hosfield and C.P. Green (eds.), *Quaternary history and palaeolithic archaeology in the Axe Valley at Broom, South West England,* p.261 – 276. Oxford: Oxbow.

Hosfield, R., Cole, J. and McNabb, J. (2018). Less of a bird's song than a hard rock ensemble. *Evolutionary Anthropology: Issues, News, and Reviews* 27(1), p.9 – 20.

Howell, F.C., Cole, G.H. and Kleindienst, M.R. (1962). Isimila – An Acheulian Occupation Site in the Iringa Highlands, Southern Highlands Province, Tanganyika. *Du IV Congres Panafricain de Prehistoire et de L'Etude de Quaternaire, Tervuren*, p. 43–80.

Howell, F.C. (1996). Thoughts on the study and interpretation of the human fossil record. In W.E. Meikle, F.F. Howell and N.G. Jablonski (Eds), *Contemporary Issues in Human Evolution, California Academy of Sciences Memoir 21*, p. 1 -45. San Francisco: California Academy of Sciences Memoir.

Howell, F.C. (1999). Paleo-demes, species clades, and extinctions in the Pleistocene hominin record. *Journal of Anthropological Research* 55, p. 191–243.

Hublin, J.J. (1998). Climatic changes, paleogeography, and the evolution of the Neandertals. In T. Akazawa, K. Aoki and O. Bar-Yosef (eds), *Neandertals and modern humans in Western Asia*, p.295 – 310. New York: Springer.

Hublin, J.J. and Roebroeks, W. (2009). Ebb and flow or regional extinctions? On the character of Neandertal occupation of northern environments*. Comptes Rendus Palevolution* 8(5), p.503 – 509.

Inizan, M., Reduron-Ballinger, M., Roche, M. and Tixier, J. (1999). *Technology and terminology of knapped stone*. Crep: Nanterre.

Iovita, R. and McPherron, S.P. (2011). The handaxe reloaded: A morphometric reassessment of Acheulian and Middle Paleolithic handaxes. *Journal of Human Evolution* 61(1), p.61 – 74.

Isaac, G.L. (1972). Early phases of human behaviour: models in Lower Palaeolithic archaeology. In D.L. Clarke (Ed), *Models in Archaeology*, p. 167 – 199. London: Methuen.

Isaac, G.L. (1977). *Olorgesailie: Archaeological Studies of a Middle Pleistocene Lake Basin in Kenya*. Chicago: The University of Chicago Press.

Jacobi, R.M., Rowe, P.J., Gilmour, M.A., Grün, R., and Atkinson, T. C. (1998). Radiometric dating of the Middle Palaeolithic tool industry and associated fauna of Pin Hole, Creswell Crags, England. *Journal of Quaternary Science* 13, p.29–42.

Jeffreys, M.D.W. (1965). The Hand Bolt. *Man* 65, p.153–54.

Jones, P.R. (1980). Experimental butchery with modern stone tools and its relevance for Palaeolithic archaeology. *World Archaeology* 12(2), p.153 – 165.

Jones, P.R. (1994). Results of experimental work in relation to the stone industries of Olduvai Gorge. In M. D. Leakey and D. Roe (Eds), *Olduvai Gorge: Excavations in Beds III, IV and the Masek Beds, 1968–1971*, p.254 – 298. Cambridge: Cambridge University Press.

Jöris, O. (2006). Bifacially backed knives (Keilmesser) in the Central European Middle Palaeolithic. In N. Goren-Inbar & G. Sharon (Eds), *Axe age. Acheulian tool-making from quarry to discard*, p. 287 – 310. London: Equinox.

Juby, C. (2011). *London before London: reconstructing a Palaeolithic landscape*. Unpublished doctoral dissertation, University of London.

Keeley, l. (1977). The functions of Paleolithic flint tools. *Scientific American* 237, p.108–126.

Keeley, I. (1980). *Experimental determination of stone tool uses: A microwear study*. Chicago: University of Chicago Press.

Keeley, L. (1982). Hafting and Retooling: Effects on the Archaeological Record. *American Antiquity* 47, p.798 – 809.

Keen, D.H. (1990). Significance of the record provided by Pleistocene fluvial deposits and their included molluscan faunas for palaeoenvironmental reconstruction and stratigraphy: case studies from the English Midlands. *Palaeogeography, Palaeoclimatology, Palaeoecology* 80, p. 25 – 34.

Keen, D.H. (2001). Towards a Late Middle Pleistocene non-marine molluscan biostratigraphy for the British Isles. *Quaternary Science Reviews* 20, p.1657–1665.

Kennard, A.S. and Woodward, B.B. (1922). The post-Pliocene non-marine Mollusca of the East of England. *Proceedings of the Geologists' Association* 33(2), p.104 – 142.

Kelley, D.R. (2003). The rise of prehistory. *Journal of World History* 14(1), p.17-36.

Kelly, R.L. (1995). *The foraging spectrum: Diversity in hunter-gatherer lifeways*. Washington: Smithsonian Institute Press.

Key, A.J. (2016). Integrating mechanical and ergonomic research within functional and morphological analyses of lithic cutting technology: key principles and future experimental directions. *Ethnoarchaeology* 8(1), p.69 – 89.

Key, A.J. and Lycett, S.J. (2017). Reassessing the production of handaxes versus flakes from a functional perspective. *Archaeological and Anthropological Sciences* 9(5), p.737 – 753.

Key, A.J., Proffitt, T., Stefani, E. and Lycett, S.J. (2016). Looking at handaxes from another angle: Assessing the ergonomic and functional importance of edge form in Acheulean bifaces. *Journal of Anthropological Archaeology* 44, p.43 – 55.

Kim, W.Y. and Bae, K.D. (1983). *Report of excavation, 1979–1983, Chongokni*. Seoul: Bureau of Cultural Properties, Korea.

King, W.B.R. and Oakley, K.P. (1936). The Pleistocene Succession in the Lower part of the Thames Valley. *Proceedings of the Prehistoric Society* 2, p.52 – 76.

Klein, R.G. (1989). *The Human Career: Human Biological and Cultural Origins*. Chicago: University of Chicago Press.

Klein, R.G. (2000). The Earlier Stone Age of southern Africa. *South African Archaeology Bulletin* 55, p.107–122.

Kleindienst, M. R. (1962). Components of the East African Acheulean assemblage: An analytic approach. In G. Mortelmans (Ed), *Actes du IVème Congrès Panafricain de Préhistoire et de l'Etude du Quaternaire 40*, p. 81–105. Tervuren: Musée Royal de l'Afrique Centrale.

Kleindienst, M.R. and Keller, C.M. (1976). Towards a functional analysis of handaxes and cleavers: the evidence from Eastern Africa. *Man*, p.176 – 187.

Knowles, F.H.S. (1953). *Stone-Worker's Progress. A study of stone implements in the Pitt Rivers Museum*. Oxford: Oxford University Press.

Knowles, P.G. submitted. A magnificent ficron and assemblage containing cleavers from Canterbury: a reanalysis of the collection of Dr Thomas Armstrong Bowes and a problem of provenance.

Kohn, M. and Mithen, S. (1999). Handaxes: products of sexual selection? *Antiquity* 3, p.518 – 526.

Kuhn, S.L. (2013). Roots of the middle Paleolithic in Eurasia. *Current Anthropology* 54(S8), p.S255 – S268.

Kuhn, S.L., Stiner, M.C., Reese, D.S. and Güleç, E. (2001). Ornaments of the earliest Upper Paleolithic: New insights from the Levant. *Proceedings of the National Academy of Sciences* 98(13), p.7641 – 7646.

Kukla, G. (1995). Supercycles, superterminations and the classical Pleistocene subdivisions. In *Abstracts*, Terra Nostra, Schriften der Alfred-Wegener-Stiftung, International Union for Quaternary Research, XIV International Congress: 149.

Kukla, G. (2005). Saalian supercycle, Mindel/Riss interglacial and Milankovitch's dating. *Quaternary Science Reviews* 24(14-15), p.1573 – 1583.

Lacaille, A.D. (1938). A Levallois side-scraper from the brickearth at Yiewsley, Middlesex. *The Antiquaries Journal* 18(1), p.55 – 57.

Lacaille, A.D. (1940). The palaeoliths from the gravels of the Lower Boyn Hill Terrace around Maidenhead. *The Antiquaries Journal* 20(2), p.245 – 271.

Lacaille, A.D. and Oakley, K.P. (1936). The Palaeolithic Sequence at Iver, Bucks. With an Appendix on the Geology. *The Antiquaries Journal* 16(4), p.420 – 443.

Lahaye, C. (2005). *Nouveaux apports de la thermoluminescence à la chronologie du Paléolithique dans le Sud-Ouest de la France. Etudes en milieux hétérogènes et en présence de déséquilibres radioactifs dans les séries de l'Uranium*. Unpublished doctoral dissertation, Université de Bordeaux III Montaigne.

Lamotte, A. and Tuffreau, A. (2016). Acheulean of the Somme basin (France): Assessment of lithic changes during MIS 12 to 9. *Quaternary International* 409, p.54 – 72.

Lamotte, A., Deschodt, L., Antoine, P., Guerlin, O. and Debenham, N. (2019). Le gisement acheuléen en contexte de doline de Revelles (Somme, France) et ses caractéristiques communes à l'Acheuléen méridional. *L'anthropologie* 123(4-5), p.695 – 723.

Last, J., Brown, E.J., Bridgland, D.R. and Harding, P. (2013). Quaternary geoconservation and Palaeolithic heritage protection in the 21st century: developing a collaborative approach. *Proceedings of the Geologists' Association* 124(4), p.625 – 637.

Lautridou, J.P. and Verron, G. (1970). Paléosols et loess de Saint-Pierre-lès-Elbeuf (Seine-Maritime). *Quaternaire* 7(2), p.145 – 165.

Lea, D.W., Martin, P.A., Pak, D.K. and Spero. H.J. (2002). Reconstructing a 350 ky. history of sea level using planktonic Mg/Ca and oxygen isotope records from a Cocos Ridge core. *Quaternary Science Reviews* 21, p.283 – *293*.

Leakey, M.D. (1975). Cultural patterns in the Olduvai sequence. In K.W. Butzer and G.L. Isaac (Eds), *After the Australopithecines*, p.477 – 493. Paris: Mouton Publishers.

Lee, H.W. (2001). *A Study of Lower Palaeolithic Stone Artefacts from Selected Sites in the Upper and Middle Thames Valley, with particular reference to the R.J. MacRae Collection. British Archaeological Reports British Series 319.* Oxford: BAR.

Lemorini, C., Plummer, T., Braun, D., Crittenden, A., Ditchfield, P., Bishop, L. and Potts, R. (2014). Old stones' song: Use-wear experiments and analysis of the Oldowan quartz and quartzite assemblage from Kanjera South (Kenya). *Journal of Human Evolution* 72, p.10 – 25.

Lepre, C.J., Roche, H., Kent, D.V., Harmand, S., Quinn, R.L., Brugal, J.P., Texier, P.J., Lenoble, A. and Feibel, C.S. (2011). An earlier origin for the Acheulian. *Nature* 477(7362), p. 82 – 85.

Leroy, S.A.G., Arpe, K., Mikolaiewicz, U. (2011). Vegetation context and climatic limits of the Early Pleistocene hominin dispersal in Europe. *Quaternary Science Reviews* 30, p.1448 – 1463.

Leroyer M. (2005). Les bifaces acheuléens de Saint-Pierre-lès-Elbeuf (Seine-Maritime). *Mémoire de Maîtrise*. Paris: Université de Paris I / Sorbonne.

Lewis, S.G., Maddy, D., Glenday, S. (2004). The Thames valley sediment conveyor: fluvial system development over the last two interglacial-glacial cycles [Le " convoyeur sédimentaire " de la vallée de la Tamise]. *Quaternaire* 15 (1-2), p. 17 – 28.

Lewis, S.G., Ashton, N., Field, M.H., Hoare, P.G., Kamermans, H., Knul, M., Mücher, H.J., Parfitt, S.A., Roebroeks, W. and Sier, M.J. (2019). Human occupation of northern Europe in MIS 13: Happisburgh Site 1 (Norfolk, UK) and its European context. *Quaternary Science Reviews* 211, p. 34 – 58.

Lewis, S.G., Ashton, N., Davis, R., Hatch, M., Hoare, P.G., Voinchet, P. and Bahain, J.J. (2021). A revised terrace stratigraphy and chronology for the early Middle Pleistocene Bytham River in the Breckland of East Anglia, UK. *Quaternary Science Reviews* 269, p.107 – 113.

Lhomme, V. (2007). Tools, space and behaviour in the Lower Palaeolithic: discoveries at Soucy in the Paris basin. *Antiquity* 81(313), p.536 – 554.

Lisiecki, L.E. and Raymo, M.E. (2005). A Pliocene-Pleistocene stack of 57 globally distributed benthic δ18O records. *Paleoceanography* 20(1), PA1003.

Locht, J., Antoine, P. and Swinnen, C. (1995). Le gisement paléolithique de Plachy-Buyon (Somme). *Revue archéologique de Picardie* 3(1), p.3 – 33.

Lubbock, J. (1862). On the Ancient Lake-Habitations of Switzerland. *Natural History Review* 2, p.26 – 52.

Lundberg, J. and McFarlane, D.A. (2007). Pleistocene depositional history in a periglacial terrane: A 500ka record from Kent’s Cavern, Devon, United Kingdom. *Geosphere* 3, p.199–219.

Lycett, S.J. and Norton, C.J. (2010). A demographic model for Palaeolithic technological evolution: the case of East Asia and the Movius Line. *Quaternary International* 211(1-2), p.55 – 65.

MacDonald, K., Martinón-Torres, M., Dennell, R.W. and de Castro, J.M.B. (2012). Discontinuity in the record for hominin occupation in south-western Europe: Implications for occupation of the middle latitudes of Europe. *Quaternary International* 271, p.84 – 97.

Machin, A.J. (2008). Why handaxes just aren't that sexy: a response to Kohn & Mithen (1999). *Antiquity* 82(317), p.761 – 766.

Machin, A.J., Hosfield, R.T and Mithen, S.J. (2005). Testing the functional utility of handaxe symmetry: fallow deer butchery with replica handaxes. *Lithics*, 26, p.23 – 37.

Machin, A.J., Hosfield, R.T. and Mithen, S.J. (2007). Why are some handaxes symmetrical? Testing the influence of handaxe morphology on butchery effectiveness. *Journal of Archaeological Science* 34, p.883–93.

MacRae, R.J. (1982). Palaeolithic artefacts from Berinsfield, Oxfordshire. *Oxoniensia* 47, p.1 – 11.

MacRae, R.J. (1987). The great giant handaxe stakes. *Lithics* 8, p.15-17.

MacRae, R.J. (1988). Belt, shoulder-bag or basket? An enquiry into handaxe transport and flint sources. *Lithics* 9, p.2 – 8.

MacRae, R.J. (1990). New finds and old problems in the Lower Palaeolithic of the Upper Thames valley. *Lithics* 11, p. 3–15.

MacRae, R.J. (1991). STOP PRESS: A Handaxe from the Stanton Harcourt Interglacial Channel. *Lithics* 12, p. 13 – 19.

MacRae, R.J. (1999). New Lower Palaeolithic finds in Norfolk. *Lithics* 20, p. 1 – 9.

Maddy, D. (1997). Uplift-driven valley incision and river terrace formation in southern England. *Journal of Quaternary Science* 12(6), p.539 – 545.

Maddy, D. and Bridgland, D.R. (2000). Accelerated uplift resulting from Anglian glacioisostatic rebound in the Middle Thames Valley, UK: evidence from the river terrace record. *Quaternary science reviews* 19(16), p.1581 – 1588.

Maddy, D., Lewis, S.G. and Green, C.P. (1991). A review of the stratigraphic significance of the Wolvercote Terrace of the Upper Thames Valley. *Proceedings of the Geologists' Association* 102(3), p.217 – 225.

Maddy, D., Bridgland, D.R. and Green, C.P. (2000). Crustal uplift in southern England: evidence from the river terrace records. *Geomorphology* 33(3-4), p.167 – 181.

Malinsky-Buller, A. (2016). Lost and found: technological trajectories within Lower/Middle Paleolithic transition in Western Europe, North of the Pyrenees. *Quaternary international* 409, p.104 – 148.

Marsden, J.G. (1927). Note on Le Moustier Flints from Acton, West Drayton and Iver. *Proceedings of the Prehistoric Society of East Anglia* 5(3), p.297 – 298.

Marshall, G.D., Gamble, C.G., Roe, D.A., and Dupplaw, D. (2002). Acheulian biface database. URL: http://archaeologydataservice.ac.uk/archives/view/bifaces/bf_query.cfm ADS, York. Accessed on 5th March 2021.

Marshall, P., Bayliss, A., Grant, M., Bridgland, D.R., Duller, G., Housley, R., Matthews, I., Outram, Z., Penkman, K.E.H., Pike, A., Schreve, D. and Xuan, C. (2020). Scientific dating of Pleistocene sites: guidelines for best practice. Historic England, Swindon, UK. URL: https://historicengland.org.uk/content/docs/guidance/scientific-dating-pleistocene-sites-consultation-draft/, accessed on 29th March 2021.

Mathias, C., Bourguignon, L., Brenet, M., Grégoire, S. and Moncel, M.H. (2020). Between new and inherited technical behaviours: a case study from the Early Middle Palaeolithic of Southern France. *Archaeological and Anthropological Sciences*, 12(7), p.1 – 39.

Matskevich, Z., Goren-Inbar, N. and Gaudzinski-Windheuser, S. (2001). A newly identified Acheulian handaxe type at Tabun Cave: the Faustkeilblätter. In J. Cook and S. Milliken (eds), *A Very Remote Period Indeed: Papers on the Palaeolithic Presented to Derek Roe*, p.120 – 131. Oxford: Oxbow.

Mayr, E. (1956). Geographical character gradients and climatic adaptation. *Evolution* 10(1), p.105 – 108.

McBrearty, S. and Tryon, C. (2006). From Acheulean to middle stone age in the Kapthurin formation, Kenya. In E. Hovers and S.L. Kuhn (eds.), *Transitions before the transition,* p. 257 – 277. Springer: Boston, MA.

McGregor, D.F. and Green, C.P. (1983). Post-depositional modification of Pleistocene terraces of the River Thames. *Boreas* 12(1), p.23 – 33.

McNabb, J. (1992). *The Clactonian: British Lower Palaeolithic flint technology in biface and non-biface assemblages*. Unpublished doctoral dissertation, University College London.

McNabb, J. (1996). More from the cutting edge: further discoveries of Clactonian bifaces. *Antiquity* 70(268), p.428 – 436.

McNabb, J. (2007). *The British Lower Palaeolithic: Stones in Contention*. Abingdon: Routledge.

McNabb, J. (2020). Further thoughts on the genetic argument for handaxes. *Evolutionary Anthropology: Issues, News, and Reviews* 29(5), p.220 – 236.

McNabb, J. and Ashton, N. (1992). The Cutting Edge, Bifaces in the Clactonian, *Lithics*, 13. 4 – 10.

McNabb, J. and Ashton, N. (1995). Thoughtful flakers. *Cambridge Archaeological Journal* 5(2), p.289 – 298.

McNabb, J. and Ashton, N. (2016). The cutting edge, bifaces in the Clactonian. *Lithics* 13, p.4 – 10.

McNabb, J. and Cole, J. (2015). The mirror cracked: Symmetry and refinement in the Acheulean handaxe. *Journal of Archaeological Science: Reports* 3, p.100 – 111.

McNabb, J. and Rivett, C. (2015). Getting round to the point: biface tip shape in the British Lower Palaeolithic. *Lithics* 28, p.20 – 32.

McNabb, J., Binyon, F., Hazelwood, L., Machin, A., Mithen, S., Petraglia, M.D., Rolland, N., White, M., Wynn, T. and McNabb, J. (2004). The large cutting tools from the South African Acheulean and the question of social traditions. *Current Anthropology* 45(5), p.653 – 677.

McNabb, J., Hosfield, R., Dearling, K., Barker, D., Strutt, K., Cole, J., Bates, M. and Toms, P. (2012). Recent work at the lower Palaeolithic site of Corfe Mullen, Dorset, England. *Proceedings of the Prehistoric Society* 78, p.35 – 50.

McPherron, S.P. (1994). *A Reduction Model for Variability in Acheulian Biface Morphology*. Unpublished doctoral dissertation, University of Pennsylvania.

McPherron, S.P. (1995). A Re-examination of the British biface data. *Lithics* 16, p.47 – 63.

McPherron, S.P. (1999). Ovate and pointed handaxe assemblages: two points make a line. *Préhistoire Européenne* 14, p.9 – 32.

McPherron, S.P. (2000). Handaxes as a measure of the mental capabilities of early hominids. *Journal of Archaeological Science* 27(8), p.655 – 663.

McPherron, S.P. (2003). Technological and typological variability in the bifaces from Tabun Cave, Israel. In M. Soressi and H.L. Dibble (eds), *Multiple approaches to the study of bifacial technology*, p. 55 – 75. Philadelphia: University of Pennsylvania Museum Press.

Mellars, P. (1996). *The Neanderthal Legacy*. Princeton: Princeton Press.

Méndez-Quintas, E., Santonja, M., Arnold, L.J., Cunha-Ribeiro, J.P., da Silva, P.X., Demuro, M., Duval, M., Gomes, A., Meireles, J., Monteiro-Rodrigues, S. and Pérez-González, A. (2020). The Acheulean Technocomplex of the Iberian Atlantic Margin as an Example of Technology Continuity Through the Middle Pleistocene. *Journal of Paleolithic Archaeology* 3, p.918 – 943.

Mercier, N., Valladas, H., Valladas, G., Reyss, J.L., Jelinek, A., Meignen, L. and Joron, J.L. (1995). TL dates of burnt flints from Jelinek's excavations at Tabun and their implications. *Journal of Archaeological Science* 22(4), p.495 – 509.

Meyer, M., Arsuaga, J.L., de Filippo, C., Nagel, S., Aximu-Petri, A., Nickel, B., Martínez, I., Gracia, A., de Castro, J.M.B., Carbonell, E. and Viola, B. (2016). Nuclear DNA sequences from the Middle Pleistocene Sima de los Huesos hominins. *Nature* 531(7595), p.504 – 507.

Milankovitch, M. (1941), *Kanon der Erdbestrahlung und seine Andwendung auf das Eiszeiten-problem*. Belgrade: R. Serbian Acad.

Mitchell, G.F., Penny, L.F., Shotton, F.W., West, R.G. (1973). A correlation of Quaternary deposits in the British Isles. *Geological Society of London Special Report* 4, p. 99.

Mitchell, J.C. (n.d.). Use-wear analysis of four Bifaces from South Woodford. Unpublished manuscript, currently in the care of M. White.

Mitchell, J.C. (1996). Quantitative image analysis of lithic microwear on flint handaxes. *Microscopic Analysis* 61, p.15–17.

Mithen, S. (1994). Technology and society during the Middle Pleistocene: hominid group size, social learning and industrial variability. *Cambridge Archaeological Journal* 4(1), p.3 – 32.

Mithen, S. (2003). Handaxes: the first aesthetic artefacts. In E. Volands and K. Grammar (eds), *Evolutionary aesthetics,* p.261 – 275. Berlin, Heidelberg: Springer.

Molines, N., Monnier, J.L., Hinguant, S. and Halleguet, B. (2005). L'Acheuléen de l'ouest de la France: apports du site de Menez Dregan I (Plouhinec, Finistère, France). In N. Molines, M.H. Moncel, J.L. Monnier (eds), *Les Premiers Peuplements en Europe*, p.533 – 544. Oxford: BAR International Series.

Moncel, M.H. and Ashton, N. (2018). From 800 to 500 ka in Western Europe. The oldest evidence of Acheuleans in their technological, chronological, and geographical framework. In R. Gallotti and M. Mussi (eds.), *The Emergence of the Acheulean in East Africa and Beyond,* p. 215 – 235. Cham: Springer.

Moncel, M., Moigne, A., Sam, Y., and Combier, J. (2011). The Emergence of Neanderthal Technical Behavior: New Evidence from Orgnac 3 (Level 1, MIS 8), Southeastern France. *Current Anthropology* 52, p.37 – 75.

Moncel, M.H., Moigne, A.M., and Combier, J. (2012). Towards the Middle Paleolithic in western Europe: the case of Orgnac 3 (South-Eastern France). *Journal of Human Evolution* 63, p.653 – 666.

Moncel, M.H., Ashton, N.M. and Lamotte, A. (2015). North-west Europe early Acheulian. *Journal of Anthropological Archaeology* 40, p.302 – 331.

Moncel, M.H., Biddittu, I., Manzi, G., Saracino, B., Pereira, A., Nomade, S., Hertler, C., Voinchet, P. and Bahain, J.J., (2020a). Emergence of regional cultural traditions during the Lower Palaeolithic: the case of Frosinone-Ceprano basin (Central Italy) at the MIS 11–10 transition. *Archaeological and Anthropological Sciences* 12(8), p.1 – 32.

Moncel, M.H., Ashton, N., Arzarello, M., Fontana, F., Lamotte, A., Scott, B., Muttillo, B., Berruti, G., Nenzioni, G., Tuffreau, A. and Peretto, C. (2020b). Early Levallois core technology between marine isotope stage 12 and 9 in Western Europe. *Journal of human evolution* 139, p.102735.

Monnier, G. (2006). The Lower/Middle Paleolithic periodization in Western Europe. *Current Anthropology* 47, p.709–744.

Mourre, V. and Colonge, D. (2007). Et si l'Acheuléen méridional n'était pas là où on l'attendait. *Un siècle de construction du discours scientifique en préhistoire: congrès du centenaire de la Société Préhistorique Française* 3, p.63 – 78.

Movius, H.L. (1948). The Lower Palaeolithic Cultures of Southern and Eastern Asia. *Transactions of the American Philosophical Society* 38, p.329–426.

Movius, H.L. (1956). New Palaeolithic sites, near Ting-Ts'un in the Fen river, Shansi province, North China. *Quarteraria* 3, p.13–26.

Movius, H.L. (1969). Lower Paleolithic archaeology in southern Asia and the Far East. In W.W. Howells (Ed), *Early Man in the Far East, Studies in Physical Anthropology No.1*, p. 17 – 82. New York: Humanities Press.

Movius, H.L. (2011). Southern and eastern Asia: conclusions. In F. Ikawa-Smith (ed.), *Early Paleolithic in South and East Asia,* p. 351 – 356. Berlin: De Gruyter Mouton.

Mozzi, P., Azevedo, M.T., Nunes, E. and Raposo, L. (2000). Middle terrace deposits of the Tagus river in Alpiarça, Portugal, in relation to early human occupation. *Quaternary Research* 54(3), p.359 – 371.

Narr, K. (1979). 'Reply', in 'The Clactonian: An Independent Complex or an Integral Part of the Acheulean?', *Current Anthropology* 20. 685 – 726.

Neves, A.G. and Serva, M. (2012). Extremely rare interbreeding events can explain Neanderthal DNA in living humans. *PLoS One* 7(10), p.e47076.

Nitychoruk, J., Bińka, K., Hoefs, J., Ruppert, H. and Schneider, J. (2005). Climate reconstruction for the Holsteinian Interglacial in eastern Poland and its comparison with isotopic data from Marine Isotope Stage 11. *Quaternary Science Reviews* 24(5-6), p.631 – 644.

Norton, C.J. and Bae, K. (2008). The Movius Line sensu lato (Norton et al. 2006) further assessed and defined. *Journal of Human Evolution* 55, p.1148–1150.

Norton, C.J., Bae, K., Harris, J.W.K. and Lee, H. (2006). Middle Pleistocene handaxes from the Korean Peninsula. *Journal of Human Evolution* 51, p.527–536.

Nowell, A. and Chang, M.L. (2009). The case against sexual selection as an explanation of handaxe morphology. *Paleoanthropology* 2009, p.77 – 88.

Nowell, A. and White, M. (2010). Growing up in the Middle Pleistocene: life history strategies and their relationship to Acheulian industries. In A. Nowell and I. Davidson (eds), *Stone Tools and the Evolution of Human Cognition*, p.67 – 82. Boulder, CO: University Press of Colorado.

O'Brien, E.M. (1981). The projectile capabilities of an Acheulian handaxe from Olorgesailie. *Current Anthropology* 22, p.76–79.

O'Connor, A. (2007). *Finding Time for the Old Stone Age: A History of Palaeolithic Archaeology and Quaternary Geology in Britain, 1860–1960*. Oxford: Oxford University Press.

Ohel, M.Y. (1977). On the Clactonian: reexamined, redefined, and reinterpreted. *Current Anthropology* 7(2), p.329 – 331.

Ohel, M. (1979). The Clactonian: An Independent Complex or an Integral Part of the Acheulean?, *Current Anthropology* 20. p.685 – 726.

Ohel, M. Y. (1987). The Acheulean handaxe: A maintainable multifunctional tool. *Lithic Technology* 16(2–3), p.54–55.

Ovey, C.D. (ed.) (1964). *The Swanscombe Skull: a survey of research on a Pleistocene site*. London: Royal Anthropological Institute Occasional Paper 20.

Pappu, S., Gunnell, Y., Akhilesh, K., Braucher, R., Taieb, M., Demory, F. and Thouveny, N. (2011). Early Pleistocene presence of Acheulian hominins in south India. *Science* 331(6024), p.1596 – 1599.

Palmer, S. (1975). A Palaeolithic site at North Road, Purfleet, Essex. *Transactions of the Essex Archaeological Society* 7, p.1 – 13.

Parfitt, S.A., Barendregt, R.W., Breda, M., Candy, I., Collins, M.J., Coope, G.R., Durbidge, P., Field, M.H., Lee, J.R., Lister, A.M. and Mutch, R. (2005). The earliest record of human activity in northern Europe. *Nature* 438(7070), p.1008 – 1012.

Parfitt, S.A., Ashton, N.M., Lewis, S.G. (2010). Early Pleistocene human occupation at the edge of the boreal zone in northwest Europe. *Nature* 466, p.229–233.

Paterson, T.T. (1942). *Lower Palaeolithic Man in the Cambridge district*. Unpublished doctoral dissertation, University of Cambridge.

Payne, G. (1915). Twydall. *Archaeologia Cantiana* 31, p.275–277.

Pearce, E. (2014). Modelling mechanisms of social network maintenance in hunter–gatherers. *Journal of archaeological science* 50, p.403 – 413.

Penkman, K.E.H., Preece, R.C., Bridgland, D.R., Keen, D.H., Meijer, T., Parfitt, S.A., White, T.S. and Collins, M.J. (2011). A Chronological framework for the British Quaternary based on Bithynia opercula. *Nature* 476, p.446–449.

Penkman, K.E.H., Preece, R.C., Bridgland, D.R., Keen, D.H., Meijer, T., Parfitt, S.A., White, T.S. and Collins, M.J. (2013). An aminostratigraphy for the British Quaternary based on Bithynia opercula. *Quaternary Science Reviews* 61, p.111–134.

Peretto, C., Arzarello, M., Bahain, J.J., Boulbes, N., Dolo, J.M., Douville, E., Falguères, C., Frank, N., Garcia, T., Lembo, G. and Moigne, A.M. (2016). The Middle Pleistocene site of Guado San Nicola (Monteroduni, Central Italy) on the Lower/Middle Palaeolithic transition. *Quaternary International* 411, p.301 – 315.

Pereira, A., Nomade, S., Falguères, C., Bahain, J.J., Tombret, O., Garcia, T., Voinchet, P., Bulgarelli, G.M. and Anzidei, A.P. (2017). 40Ar/39Ar and ESR/U-series data for the La Polledrara di Cecanibbio archaeological site (Lazio, Italy). *Journal of Archaeological Science: Reports* 15, p.20 – 29.

Pereira, A., Nomade, S., Moncel, M.H., Voinchet, P., Bahain, J.J., Biddittu, I., Falguères, C., Giaccio, B., Manzi, G., Parenti, F. and Scardia, G. (2018). Integrated geochronology of Acheulian sites from the southern Latium (central Italy): Insights on human-environment interaction and the technological innovations during the MIS 11-MIS 10 period. *Quaternary Science Reviews* 187, p.112 – 129.

Pettitt, P. and White, M.J. (2012). *The British Palaeolithic: human societies at the edge of the Pleistocene world*. Abingdon: Routledge.

Peyrony, D. (1938). La Micoque. Les Fouilles récentes - Leur signification. *Bulletin de la Société préhistorique française* 35(6), p.257 – 283.

Phillipson, D. W. (1994). *African Archaeology. 2nd ed*. Cambridge: Cambridge University Press.

Picin, A. (2018). Technological adaptation and the emergence of Levallois in Central Europe: new insight from the Markkleeberg and Zwachau open-air sites in Germany. *Journal of Quaternary Science* 33(3), p.300–312.

Picin, A., M. Peresani, C. Falguères, G. Gruppioni, and Bahain, J.J. (2013). San Bernardino Cave (Italy) and the appearance of Levallois technology in Europe: results of a radiometric and technological reassessment. *PloS One* 8(10), e76182.

Pitts, M. and Roberts, M.B. (1997). *Fairweather Eden: life in Britain half a million years ago as* *revealed by the excavations at Boxgrove*. London: Century.

Piva, A., Asioli, A., Schneider, R.R., Trincardi, F., Andersen, N., Colmenero-Hidalgo, E., Dennielou, B., Flores, J.A. and Vigliotti, L. (2008). Climatic cycles as expressed in sediments of the PROMESS1 borehole PRAD1-2, central Adriatic, for the last 370 ka: 1. Integrated stratigraphy. *Geochemistry, Geophysics, Geosystems* 9(1), p. 1 – 21.

Poole, H.F. (1925). Palaeoliths from Great Pan Farm, Isle of Wight. *Papers and Proceedings of the Hampshire Field Club* 9, p.305 – 319.

Pope, M.I. (2002). *The significance of biface-rich assemblages: An examination of behavioural controls on lithic assemblage formation in the Lower Palaeolithic*. Unpublished doctoral dissertation, University of Southampton.

Pope, M.I. (2004). Behavioural implications of biface discard: assemblage variability and land-use at the Middle Pleistocene site of Boxgrove. In E. Walker, F.F. Wenban-Smith and F. Healy (eds) *Lithics In Action: Lithic Studies Society Occasional Paper 8*, p.38– 47. Oxford: Oxbow.

Pope, M., Russel, K. and Watson, K. (2006) Biface Form and Structured Behaviour in the Acheulean. *Lithics* 27, p.44 – 57.

Preece, R.C. (1995). Mollusca from interglacial sediments at three critical sites in the Lower Thames. In D.R. Bridgland, P. Allen and B.A. Haggart (Eds), *The Quaternary of the Lower Reaches of the Thames. Field Guide*, p. 53 – 62. Durham: Quaternary Research Association.

Preece, R.C. (2001). Molluscan evidence for differentiation of interglacials within the 'Cromerian Complex'. *Quaternary Science Reviews* 20(16-17), p.1643 – 1656.

Preece, R.C. and Parfitt, S.A. (2012). The Early and early Middle Pleistocene context of human occupation and lowland glaciation in Britain and northern Europe. *Quaternary International* 271, p.6 – 28.

Preece, R.C. and Penkman, K.E.H. (2005). New faunal analyses and amino acid dating of the Lower Palaeolithic site at East Farm, Barnham, Suffolk. *Proceedings of the Geologists' Association* 116(3-4), p.363 – 377.

Preece, R.C., Gowlett, J.A., Parfitt, S.A., Bridgland, D.R. and Lewis, S.G. (2006). Humans in the Hoxnian: habitat, context and fire use at Beeches Pit, West Stow, Suffolk, UK. *Journal of Quaternary Science: Published for the Quaternary Research Association* 21(5), p.485 – 496.

Prestwich, J. (1861). Notes on some further Discoveries of Flint Implements in Beds of Post- Pliocene Gravel and Clay; with a few Suggestions for Search elsewhere. *Quarterly Journal of the Geological Society* 17, p.362 – 368.

Prestwich, J. (1864). Theoretical considerations on the conditions under which the (drift) deposits containing the remains of extinct mammalia and flint implements were accumulated, and on their geological age. On the Loess of the valleys of the South of England, and of the Somme and the Seine. *Philosophical Transactions of the Royal Society of London* 154, p.247 – 309.

Prigg, H. (1869). The discovery of associated works of Man, and the remains of the Elephant &c, in the gravel near Thetford. *Quarterly Journal of the Suffolk Institute of Archaeology and Natural History* 1, p.3–5.

Prosser, C.D., Brown, E.J., Larwood, J.G. and Bridgland, D.R. (2013). Geoconservation for science and society–an agenda for the future. *Proceedings of the Geologists' Association* 124(4), p.561 – 567.

Pye, D., 1978. *The nature and aesthetics of design*. New York: the Herbert Press.

Railsback, L.B., Gibbard, P.L., Head, M.J., Voarintsoa, N.R.G. and Toucanne, S. (2015). An optimized scheme of lettered marine isotope substages for the last 1.0 million years, and the climatostratigraphic nature of isotope stages and substages. *Quaternary Science Reviews* 111, p.94 – 106.

Rankine, W.F. (1955). Some palaeoliths from the Farnham terrace gravels. *Surrey Archaeological Collections* 54, p.1 – 9.

Ravon, A.L., Gaillard, C. and Monnier, J.L. (2016a). Menez-Dregan (Plouhinec, far western Europe): The lithic industry from layer 7 and its Acheulean components. *Quaternary International* 411, p.132 – 143.

Ravon, A.L., Monnier, J.L. and Laforge, M., (2016b). Menez-Dregan I, layer 4: A transitional layer between the Lower and Middle Palaeolithic in Brittany. *Quaternary International* 409, p.92 – 103.

Rawlinson, A.A.R. (2021). *The Purfleet Interglacial: An examination of change and complexity in core and flake technology during the final Lower Palaeolithic*. Unpublished doctoral dissertation, Durham University.

Rawlinson, A.A.R. and Dale, L.C. (2019). Re-evaluating Biddenham and Kempston: early prepared core technology in the Great Ouse valley. *Lithic Studies Society Conference, Newark*.

Read, J. C. (1885). The flint implements of Bemerton and Milford Hill, near Salisbury. *Wiltshire Archaeological and Natural History Magazine*, 117–123.

Reich, D., Patterson, N., Kircher, M., Delfin, F., Nandineni, M.R., Pugach, I., Ko, A.M.S., Ko, Y.C., Jinam, T.A., Phipps, M.E. and Saitou, N. (2011). Denisova admixture and the first modern human dispersals into Southeast Asia and Oceania. *The American Journal of Human Genetics* 89(4), p.516 – 528.

Richter, D. and Krbetschek, M. (2015). The age of the Lower Paleolithic occupation at Schöningen. *Journal of Human Evolution* 89, p.46 – 56.

Richter, J. (2016). Leave at the height of the party: A critical review of the Middle Paleolithic in Western Central Europe from its beginnings to its rapid decline. *Quaternary International* 411, p.107 – 128.

Rios-Garaizar, J., Garate, D., Gómez-Olivencia, A., Iriarte-Avilés, E., Aranburu-Artano, A., Arceredillo-Alonso, D., Garcia, A., Iriarte-Chiapusso, M.J., Moreno, J., Murelaga, X. and Ortíz, J.E. (2011). The Lower to Middle Palaeolithic transition in northern Iberia: new data from Arlanpe Cave. *Antiquity*, 85(329), p.1 - 5.

Rivers, W.H.R. (1926). The disappearance of useful arts. In: W.H.R. Rivers (Ed), *Psychology and Ethnology*, p.190 – 210. London: Kegan Paul, Trench, Trubner & Co. Ltd.

Roberts, A. (2013). *Chapter 9: Palaeolithic Britain*. In D. Hicks and A. Stevenson (Eds), *World Archaeology at the Pitt Rivers Museum: a characterization*, p.169 – 215. Oxford: Archaeopress.

Roberts, M.B., Parfitt, S.A. and Austin, L.A. (eds) (1999). *Boxgrove: a Middle Pleistocene hominid site at Eartham Quarry, Boxgrove, West Sussex.* London: English Heritage.

Roche, H. (2005). From simple flaking to shaping: Stone knapping evolution among early hominins. In V. Roux & B. Bril (eds.), Stone Knapping: The Necessary Conditions for a Uniquely Hominin

Behaviour, p. 35 – 48. Cambridge: McDonald Institute for Archaeological Research.

Rodríguez, J., Burjachs, F., Cuenca-Bescós, G., García, N., Van der Made, J., González, A.P., Blain, H.A., Expósito, I., López-García, J.M., Antón, M.G. and Allué, E. (2011). One million years of cultural evolution in a stable environment at Atapuerca (Burgos, Spain). *Quaternary Science Reviews*, 30(11-12), p.1396 – 1412.

Rodseth, L., Wrangham, R.W., Harrigan, A.M., Smuts, B.B., Dare, R., Fox, R., King, B.J., Lee, P.C., Foley, R.A., Muller, J.C. and Otterbein, K.F. (1991). The human community as a primate society [and comments]. *Current Anthropology* 32(3), p.221 – 254.

Roe, D.A. (1964). The British Lower and Middle Palaeolithic: some problems, methods of stud, and preliminary results. *Proceedings of the Prehistoric Society* 30, p.245–267.

Roe, D.A. (1968a). British Lower and Middle Palaeolithic handaxe groups. *Proceedings of the Prehistoric Society* 34, p.1–82.

Roe, D.A. (1968b). A gazetteer of British Lower and Middle Palaeolithic sites. *Council for British Archaeology* 8, p.335 – 355.

Roe, D.A. (1981). *The Lower and Middle Palaeolithic Periods in Britain*. London: Routledge & Keegan Paul.

Roe, D.A. (1994). The Palaeolithic Archaeology of the Oxford Region. *Oxoniensia* 59, p.1 – 15.

Roe, D.A. (2001). Some earlier Palaeolithic find-spots of interest in the Solent region. In F.F. Wenban-Smith and R.T. Hosfield (eds), *Palaeolithic Archaeology of the Solent River: Lithic Studies Society Occasional Paper 7,* p. 47–56. London: Lithic Studies Society.

Roe, D.A. (2009). Worthington George Smith (1835-1917). *Lithics* 30, p.85 – 95.

Roe, H.M. (1999). Late Middle Pleistocene sea-level change in the southern North Sea: the record from eastern Essex, UK. *Quaternary International* 55, p.115–128.

Roe, H.M. and Preece, R.C. (2011). Incised palaeo-channels of the late Middle Pleistocene Thames: age, origins and implications for fluvial palaeogeography and sea-level reconstruction in the southern North Sea basin. *Quaternary Science Reviews* 30(19-20), p.2498 – 2519.

Roe, H.M., Coope, G.R., Devoy, R.J., Harrison, C.J., Penkman, K.E., Preece, R.C. and Schreve, D.C. (2009). Differentiation of MIS 9 and MIS 11 in the continental record: vegetational, faunal, aminostratigraphic and sea-level evidence from coastal sites in Essex, UK. *Quaternary Science Reviews* 28(23-24), p.2342 – 2373.

Roe, H.M., Penkman, K.E., Preece, R.C., Briant, R.M. and Wenban-Smith, F.F. (2011). Evolution of the Thames estuary during MIS 9: insights from the Shoeburyness area, Essex. *Proceedings of the Geologists' Association* 122(3), p.397 – 418.

Roebroeks, W. (2001). Hominid behaviour and the earliest occupation of Europe: an exploration. *Journal of Human Evolution*, 41(5), p.437 – 461.

Roebroeks, W. and Stapert, D. (1986). On the "Lower Palaeolithic" site La Belle Roche: An Altemative Interpretation. *Current Anthropology* 27, p. 369 – 371.

Roebroeks, W., and Villa, P. (2011). On the earliest evidence for habitual use of fire in Europe. *Proceedings of the National Academy of Sciences of the United States of America* 108, 5209e5214. doi:10.1073/pnas.1018116108.

Rogerson, R.J. (1987). *The terraces of the River Great Ouse*. Unpublished doctoral dissertation, University of London.

Roksandic, M., Radović, P. and Lindal, J. (2017). Revising the hypodigm of Homo heidelbergensis: A view from the Eastern Mediterranean. *Quaternary International* 466, p.66 – 81.

Rolland, N. (1995). Levallois technique emergence: Single or multiple? A review of the Euro-African record. In H. Dibble and O. Bar-Yosef (eds.), *The definition and interpretation of Levallois technology.* p. 333 – 359. Madison, WI: Prehistory Press.

Rolland, N. and Dibble, H.L. (1990). A new synthesis of Middle Paleolithic variability. *American Antiquity* 55(3), p.480 – 499.

Rose, J. (1992). High Lodge: regional context and geological background. In N. Ashton, J. Cook, S.G. Lewis and J. Rose (Eds), *High Lodge: Excavations by G. de Sieveking, 1962-8, and J. Cook, 1988*, p.13 – 24. London: British Museum Press.

Rose, J. (2009). Early and Middle Pleistocene landscapes of eastern England. *Proceedings of the Geologists' Association* 120, p. 3 – 33.

Roucoux, K.H., Tzedakis, P.C., De Abreu, L. and Shackleton, N.J. (2006). Climate and vegetation changes 180,000 to 345,000 years ago recorded in a deep-sea core off Portugal. *Earth and Planetary Science Letters* 249(3-4), p.307 – 325.

Rowe, P.J., Richards, D.A., Atkinson, T.C., Bottrell, S.H. and Cliff, R.A. (1997). Geochemistry and radiometric dating of a Middle Pleistocene peat. *Geochimica et Cosmochimica Acta* 61(19), p.4201 – 4211.

Royse, K.R., De Freitas, M., Burgess, W.G., Cosgrove, J., Ghail, R.C., Gibbard, P., King, C., Lawrence, U., Mortimore, R.N., Owen, H. and Skipper, J. (2012). Geology of London, UK. *Proceedings of the Geologists' Association* 123, p.22 – 45.

Rubio-Jara, S., Panera, J., Rodríguez-de-Tembleque, J., Santonja, M. and Pérez-González, A. (2016). Large flake Acheulean in the middle of Tagus basin (Spain): Middle stretch of the river Tagus valley and lower stretches of the rivers Jarama and Manzanares valleys. *Quaternary international* 411, p.349 – 366.

Ruebens, K. (2012). *From Keilmesser to Bout Coupé Handaxes: Macro-regional Variability Among Western European Late Middle Paleolithic Bifacial Tools*. Unpublished doctoral dissertation, University of Southampton.

Ruebens, K. (2013). Regional behaviour among late Neanderthal groups in Western Europe: a comparative assessment of late Middle Palaeolithic bifacial tool variability. *Journal of Human Evolution* 65(4), p.341 – 362.

Ryssaert, C. (2006). Some new insights in an old collection: lithic technology at Mesvin IV. *Notae Praehistoricae* 26, p. 91 – 99.

Sainty, J.E. (1933). Some Norfolk Palaeolithic discoveries. With an appendix on Implementiferous gravels in East Anglia by Dr J.D. Solomon. *Proceedings of the Prehistoric Society of East Anglia* 7(2), p.171–176.

Sainty, J.E. and Boswell, P.G.H. (1926). An Acheulean Palaeolithic Workshop Site at Whitlingham, near Norwich. *Proceedings of the Prehistoric Society of East Anglia* 5(2), p.177 – 209.

Sandford, K.S. (1924). The river-gravels of the Oxford district. *Quarterly Journal of the Geological Society* 80(1-4), p.113 – 170.

Sano, K., Beyene, Y., Katoh, S., Koyabu, D., Endo, H., Sasaki, T., Asfaw, B. and Suwa, G. (2020). A 1.4-million-year-old bone handaxe from Konso, Ethiopia, shows advanced tool technology in the early Acheulean. *Proceedings of the National Academy of Sciences* 117(31), p.18393 – 18400.

Santa Luca, A.P. (1978). A re-examination of presumed Neandertal-like fossils. *Journal of Human Evolution* 7(7), p.619 – 636.

Santonja, M. and Villa, P. (2006). The Acheulian of western Europe. In N. Goren-Inbar and G. Sharon (eds), *Axe age: Acheulian toolmaking, from quarry to discard*, p.429–478. Jerusalem: Equinox.

Saragusti, I., Sharon, I., Katzenelson, O. and Avnir, D. (1998). Quantitative analysis of the symmetry of artefacts: Lower Paleolithic handaxes. *Journal of Archaeological Science* 25(8), p.817 – 825.

Saville, A. and O'Neil, M. (1997). Palaeolithic handaxes in Scotland. *Proceedings of the Society of Antiquaries of Scotland* 127, p.1 – 16.

Schick, K.D. and Toth, N. (1993). *Making Silent Stones Speak: Human Evolution and The Dawn of Technology*. New York: Simon & Schuster.

Schoch, W.H., Bigga, G., Böhner, U., Richter, P. and Terberger, T. (2015). New insights on the wooden weapons from the Paleolithic site of Schöningen. *Journal of human evolution* 89, p.214 – 225.

Schreve D.C. (1997). *Mammalian biostratigraphy of the later Middle Pleistocene in Britain*. Unpublished doctoral dissertation, University of London.

Schreve, D.C. (2001). Differentiation of the British late Middle Pleistocene interglacials: the evidence from mammalian biostratigraphy. *Quaternary Science Reviews* 20(16-17), p.1693 – 1705.

Schreve, D.C., Bridgland, D.R., Allen, P., Blackford, J.J., Gleed-Owen, C.P., Griffiths, H.I., Keen, D.H. and White, M.J. (2002). Sedimentology, palaeontology and archaeology of late Middle Pleistocene River Thames terrace deposits at Purfleet, Essex, UK. *Quaternary Science Reviews* 21(12-13), p.1423 – 1464.

Schreve, D.C., Allen, P., Bridgland, D.R., Brown, E.J., White, M.J., White, T.S., Dale, L.C. and Rawlinson, A.A. (2019). Purfleet Chalk Pits SSSI. In D.R. Bridgland, R.M. Briant, P. Allen, E.J. Brown, and T.S. White (eds.), *The Quaternary Fluvial Archives of the Major English Rivers, QRA Field Guide*, p. 107 – 119. Durham: Quaternary Research Association.

Scott, K. and Buckingham, C.M. (2001). A river runs through it: A decade of research at Stanton Harcourt. In S. Milliken and J. Cook (eds), *A very remote period indeed. Papers on the Palaeolithic presented to Derek Roe*, p.207 – 213. Oxford: Oxbow.

Scott, K. and Buckingham, C.M. (2021). *Mammoths and Neanderthals in the Thames Valley*. Oxford: Archaeopress.

Scott, R. (2010). *Becoming Neanderthal: The Earlier British Middle Palaeolithic*. Oxford: Oxbow.

Scott, R. and Ashton, N. (2011). The early middle Palaeolithic: the European context. *Developments in quaternary sciences* 14, p. 91 – 112.

Scott, R., Ashton, N., Penkman, K.E., Preece, R.C. and White, M.J. (2010). The position and context of Middle Palaeolithic industries from the Ebbsfleet Valley, Kent, UK. *Journal of Quaternary Science* 25(6), p.931 – 944.

Sealy, K.R., and Sealy, C.E. (1956). The terraces of the Middle Thames. *Proceedings of the Geologists' Association* 67(3-4), p.369 – 392.

Shackleton, N.J. (1969). The Last Interglacial in the Marine and Terrestrial Records. Proceedings of the Royal Society of London. *Series B, Biological Sciences* 17, p.135 – 154.

Shackleton, N.J. (1987). Oxygen isotopes, ice volume and sea-level. *Quaternary Science Review*s 6, p. 183 – 190.

Shackleton, N.J. (2000). The 100,000-year Ice-Age cycle identified to lag temperature, carbon dioxide and orbital eccentricity. *Science* 289, p.1897 – 1902.

Shackleton, N.J. and Opdyke, N.D. (1973). Oxygen isotope and palaeomagnetic stratigraphy of Equatorial Pacific core V28-238: Oxygen isotope temperatures and ice volumes on a 105 year and 106 year scale. *Quaternary research* 3(1), p.39 – 55.

Shackley, M. L. (1978). The behaviour of artefacts as sedimentary particles in a fluviatile environment. *Archaeometry* 20, p.55 – 61.

Sharon, G. (2007). *Acheulean large flake industries: technology, chronology and significance*. British Archaeological Reports. Oxford: BAR.

Sharon, G. (2010). Large flake Acheulian. *Quaternary International* 223, p.226 – 233.

Shaw, A.D. and White, M.J. (2003). Another look at the Cuxton handaxe assemblage. *Proceedings of the Prehistoric Society* 69, p.305 – 314.

Shimelmitz, R., Bisson, M., Weinstein-Evron, M. and Kuhn, S.L. (2017). Handaxe manufacture and re-sharpening throughout the Lower Paleolithic sequence of Tabun Cave. *Quaternary International* 428, p.118 – 131.

Shipton, C. (2013). A million years of human sociality and cognition. Acheulean bifaces in the Hunsgi-Baichbal Valley, India: BAR 2468. Oxford: BAR.

Shipton, C. (2016). Hierarchical organization in the Acheulean to Middle Palaeolithic transition at Bhimbetka, India. *Cambridge Archaeological Journal* 26(4), p.601 – 618.

Shipton, C. (2020). The unity of Acheulean culture. In H.S. Groucutt (ed), *Culture History and Convergent Evolution*, p. 13 – 27. Cham: Springer Nature.

Shipton, C. and Clarkson, C. (2015). Handaxe reduction and its influence on shape: An experimental test and archaeological case study. *Journal of Archaeological Science: Reports* 3, p.408 – 419.

Shipton, C. and White, M. (2020). Handaxe types, colonization waves, and social norms in the British Acheulean. *Journal of Archaeological Science: Reports* 31, p.102352.

Shipton, C., Clarkson, C., Pal, J.N., Jones, S.C., Roberts, R.G., Harris, C., Gupta, M.C., Ditchfield, P.W. and Petraglia, M.D. (2013). Generativity, hierarchical action and recursion in the technology of the Acheulean to Middle Palaeolithic transition: a perspective from Patpara, the Son Valley, India. *Journal of Human Evolution* 65(2), p.93 – 108.

Shott, M. (1986). Technological Organization and Settlement Mobility: An Ethnographic Examination. *Journal of Anthropological Research* 42, p.15–51.

Shrubsole, O.A. (1885). On Certain Less Familiar Forms of Palaeolithic Flint Implements from the Gravel at Reading. *The Journal of the Anthropological Institute of Great Britain and Ireland* 14, p. 192 – 200

Shrubsole, O.A. (1890). On the Valley-gravels about Reading, with especial reference to the Palæolithic Implements found in them. *Quarterly Journal of the Geological Society* 46(1-4), p.582 – 594.

Siddall, M., Rohling, E.J., Almogi-Labin, A., Hemleben, CH., Meischner, D., Schmelzer I. and Smeed D.A. (2003). Sea-level fluctuations during the last glacial cycle. *Nature* 423, p.853–858.

Singer, R., Gladfelter B.G., and Wymer, J.J. (eds) (1993). *The Lower Palaeolithic site at Hoxne, England*. London: The University of Chicago Press.

Smith, R.A. (1922). Flint implements of special interest. Archaeologia 72, p.25 – 40.

Smith, R.A. (1926). *British Museum Guide to Antiquities*. London: British Museum.

Smith, G.M. (2013). Taphonomic resolution and hominin subsistence behaviour in the Lower Palaeolithic: differing data scales and interpretive frameworks at Boxgrove and Swanscombe (UK). *Journal of Archaeological Science* 40(10), p.3754 – 3767.

Smith, W.G. (1879). On Palaeolithic Implements from the Valley of the Lea. *The Journal of the Anthropological Institute of Great Britain and Ireland* 8, p.275 – 279.

Smith, W.G. (1882). Palaeolithic Gravels of North-East London. *Nature* 26, p.579 – 582.

Smith, W.G. (1887a). Primæval man in the valley of the Lea. *Essex Naturalist* 1, p.36—38, 83—91, 125—137.

Smith, W.G. (1887b). On a Palaeolithic floor at northeast London. *Essex Naturalist* 1, p.357—384.

Smith, W.G. (1894). *Man, the Primeval Savage: His Haunts and Relics from the Hill-tops of Bedfordshire to Blackwall*. London: E. Stanford.

Smith, W.G. (1904b). Early Man. In H.A. Doubleday and W. Page (eds), The Victoria History of the County of Bedford 1, p.145 – 174. London: Victoria County History.

Smith, W.G. (1916a). Notes on the Palaeolithic floor near Caddington. *Archaeologia* 67, p.49—74.

Solodenko, N., Zupancich, A., Cesaro, S.N., Marder, O., Lemorini, C. and Barkai, R. (2015). Fat residue and use-wear found on Acheulian biface and scraper associated with butchered elephant remains at the site of Revadim, Israel. *PloS one* 10(3), p.e0118572.

Soriano, S. and Villa, P. (2017). Early Levallois and the beginning of the Middle Palaeolithic in central Italy. *Plos One* 12: e0186082.

Spikins, P. (2012). Goodwill hunting? Debates over the 'meaning' of Lower Palaeolithic handaxe form revisited. *World Archaeology* 44(3), p.378 – 392.

Stevens, J. (1882). On the Earliest Known Traces of Man in the Thames Drift, at Reading. *Reports and Transactions of the Berkshire Archaeological and Architectural Society 1881–1882*, p.1–18.

Stout, D. and Chaminade, T. (2009). Making tools and making sense: complex, intentional behaviour in human evolution. *Cambridge Archaeological Journal* 19(1), p.85 – 96.

Stringer, C.B. and Hublin, J.J. (1999). New age estimates for the Swanscombe hominid, and their significance for human evolution. *Journal of Human Evolution* 37(6), p.873 – 877.

Stringer, C.B. and Barnes, I. (2015). Deciphering the Denisovans. *Proceedings of the National Academy of Sciences* 112(51), p.15542 – 15543.

Tattersall, I., Delson, E. and Van Couvering, J. (1988). *Encyclopedia of Human Evolution and Prehistory*. New York: Garland.

Taylor, C.J.W. (2019). Lower Palaeolithic handaxes from Seven Kings and Leytonstone, London. *Lithics* 39, p.5 – 19.

Tennie, C., Braun, D. R., Premo, L. and McPherron, S. P. (2016). The Island test for cumulative culture in the Paleolithic. In M. N. Haidle, N. Conard, and M. Bolus (eds), *The Nature of Culture*, p.121 – 133. Dordrecht: Springer.

Tennie, C., Premo, L., Braun, D. R., and McPherron, S. P. (2017). Early stone tools and cultural transmission. *Current Anthropology* 58, p.652–672.

Tester, P.J. (1965). An Acheulian site at Cuxton. *Archaeologia Cantiana* 80, p.30–60.

Thieme, H. (1997). Lower Palaeolithic hunting spears from Germany. *Nature* 385(6619), p.807 – 810.

Thomas, G.N. (2001). Late Middle Pleistocene pollen biostratigraphy in Britain: pitfalls and possibilities in the separation of interglacial sequences. *Quaternary Science Reviews* 20(16-17), p.1621 – 1630.

Tixier, J. (1956). Le hachereau dans l'Acheuléen Nord-Africain—Notes Typologiques. In *Congrès préhistorique de France—Compte-rendu de la XVème session—Poitiers-Angoulême—15–22 juillet 1956*, p.914–923.

Tizzard, L., Bicket, A.R., Benjamin, J. and Loecker, D.D. (2014). A Middle Palaeolithic site in the southern North Sea: investigating the archaeology and palaeogeography of Area 240. *Journal of Quaternary Science* 29(7), p.698–710.

Tizzard, L., Bicket, A.R., De Loecker, D.D. and Benjamin, J. (eds) (2015). *Seabed prehistory: investigating the palaeogeography and early middle Palaeolithic archaeology in the Southern North Sea (Vol. 35)*. Salisbury: Wessex Archaeology.

Toms, P. (2013). Chapter 6. Optical Dating. In R. Hosfield and C.P. Green (eds.), *Quaternary history and palaeolithic archaeology in the Axe Valley at Broom, South West England,* p.157 – 164. Oxford: Oxbow.

Torrence, R. (1983). Time Budgeting and Hunter-Gatherer Technology. In G. Bailey (ed), *Hunter Gatherer Economy in Prehistory*, p. 11-22. Cambridge: Cambridge University Press.

Treacher, L. (1896a). Palaeolithic Man in East Berks I. *Berkshire, Buckinghamshire and Oxfordshire Archaeological Journal* 2, p.16 – 18.

Treacher, L. (1896b). Palaeolithic Man in East Berks II. *Berkshire, Buckinghamshire and Oxfordshire Archaeological Journal* 2, p.39 – 43.

Treacher, L. (1904). On the Occurrence of Stone Implements in the Thames Valley Between Reading and Maidenhead. *Man* 4, p.17 – 19.

Treacher, L. and Allen, H.A. (1897). Excursion to Cookham: Saturday, May 1st, 1897. *Proceedings of the Geologists' Association* 15(3), p.101-104.

Treacher, L. and White H.J.O. (1909). Excursion to Maidenhead: Saturday, May 1st, 1909. *Proceedings of the Geologists' Association* 21(4), p.198 – 201.

Treacher, M.S., Arkell, W.J. and Oakley, K.P. (1948). On the ancient channel between Caversham and Henley, Oxfordshire, and its contained flint implements. *Proceedings of the Prehistoric Society* 14, p.126 – 154.

Tuffreau, A. (1995). The variability of Levallois technology in northern France and neighbouring areas, In H. Dibble and O. Bar-Yosef (eds.), *The definition and interpretation of Levallois technology*, p. 413 – 427. Madison, WI: Prehistory Press.

Tuffreau, A. and Antoine, P. (1995). The earliest occupation of Europe. In W. Roebroeks and T. van Kolfschoten (eds), *The Earliest Occupation of Europe: Proceedings of the European Science Foundation Workshop at Tautavel (France), 1993*, p.147. Leiden: Leiden University Press.

Tuffreau, A., Antoine, P., Marcy, J.L. and Segard, N. (2001). Les industries paléolithiques à nombreux bifaces du mont de l'Évangile à Gentelles (Somme). Les industries à outils bifaciaux du Paléolithique moyen d'Europe occidentale. *ERAUL, Liège* 98, p.29 – 41.

Tuffreau, A., Lamotte, A. and Goval, É. (2008). Les industries acheuléennes de la France septentrionale. *L'anthropologie* 112(1), p.104 – 139.

Tumler, D., Basell, L. and Coward, F. (2017). Human perception of symmetry, raw material and size of Palaeolithic handaxes. *Lithics* 38, p.5–17.

Turner, C. (1970). Middle Pleistocene deposits at marks Tey, Essex. *Philos. Trans. Roy. Soc. B* 257, p. 373 – 437.

Turq, A. (2000). Le moustérien de type Quina. *Paléo, Revue d'Archéologie Préhistorique* 2(1), p.310 – 343.

Turq, A., Brenet, M., Colonge, D., Jarry, M., Lelouvier, L.A., O'Farrell, M. and Jaubert, J. (2010). The first human occupations in southwestern France: A revised summary twenty years after the Abbeville/Saint Riquier colloquium. *Quaternary international* 223, p.383 – 398.

Tyldesley, J.A. (1986). *The Wolvercote Channel handaxe assemblage: a comparative study (Vol. 153).* Oxford: BAR.

Tyldesley, J.A. (1987). *The Bout Coupé handaxe: a typological problem (Vol. 170)*. Oxford: BAR.

Tzedakis, P.C., Andrieu, V., de Beaulieu, J.-L., Birks, H.J.B., Crowhurst, S., Follieri, M., Hooghiemstra, H., Magri, D., Reille, M., Sadori, L., Shackleton, N.J. and Wijmstra, T.A. (2001). Establishing a terrestrial chronological framework as a basis for biostratigraphical comparisons. *Quaternary Science Reviews* 20, p.1583–1592.

Vallverdu, J., Saladié, P., Rosas, A., Huguet, R., Cáceres, I., Mosquera, M., Garcia-Tabernero, A., Estalrrich, A., Lozano-Fernández, I., Pineda-Alcalá, A. and Carrancho, Á. (2014). Age and date for early arrival of the Acheulian in Europe (Barranc de la Boella, la Canonja, Spain). *PLoS One* 9(7), e103634.

Van Andel, T.H. and Tzedakis, P.C. (1996). Palaeolithic landscapes of Europe and environs, 150,000-25,000 years ago: an overview. *Quaternary science reviews* 15(5-6), p.481 – 500.

Van Baelen, A. (2017). *The Lower to Middle Palaeolithic Transition in Northwestern Europe: Evidence from Kesselt-Op de Schans*. Leuven: Leuven University Press.

Van Kolfschoten, T., Parfitt, S.A., Serangeli, J. and Bello, S.M. (2015). Lower Paleolithic bone tools from the 'Spear Horizon' at Schöningen (Germany). *Journal of Human Evolution* 89, p.226 – 263.

Vaughan, C.D. (2001). A million years of style and function: regional and temporal variation in Acheulean handaxes. In T.D. Hurt and G.F.M. Rakita (eds), *Style and function: conceptual issues in evolutionary archaeology*, p.141 – 163. Westport: Bergen & Garvey.

Ventris, P.A. (1996). Hoxnian interglacial freshwater and marine deposits in northwest Norfolk, England and their implications for sea-level reconstruction. *Quaternary Science Reviews* 15(5-6), p.437 – 450.

Viallet, C. (2019). A new method of three-dimensional morphometry for analyzing the functional potentialities of bifaces. Contribution to the study of artefacts from AU P3 from the "Caune de l'Arago"(France). *Comptes Rendus Palevol* 18(2), p.236 – 250.

Villa, P. (1991). Middle Pleistocene prehistory in southwestern Europe: the state of our knowledge and ignorance. *Journal of Anthropological Research* 47, p.193 – 213.

Villa, P. (2009). Discussion 3: the lower to middle Paleolithic transition. In M. Camps and P. Chauhan (eds), *Sourcebook of Paleolithic transitions*, p. 265 – 270. New York: Springer.

Villa, P., Soriano, S., Grün, R., Marra, F., Nomade, S., Pereira, A., Boschian, G., Pollarolo, L., Fang, F. and Bahain, J.J. (2016). The Acheulian and early Middle Paleolithic in Latium (Italy): stability and innovation. *PloS one* 11(8), p.e0160516.

Villanea, F.A. and Schraiber, J.G. (2019). Multiple episodes of interbreeding between Neanderthal and modern humans. *Nature ecology & evolution* 3(1), p.39 – 44.

Wade, A., & Smith, R. (1934). A Palaeolithic Succession at Farnham, Surrey. *Proceedings of the Prehistoric Society of East Anglia* 7(3), p.348 – 353.

Waechter, J.D.A. (1973). The late middle Acheulean industries in the Swanscombe Area. In D.E. Strong & W.E. Grimes (eds.), *Archaeological Theory and Practice*, p.67 – 86. London: Seminar Press.

Waelbroeck, C., Labeyrie, L., Michel, E., Duplessy, J.C., McManus, J. F., Lambeck, K., Balbon, E. and Labracherie, M. (2002). Sea-level and deep water temperature changes derived from benthic foraminifera isotopic records. *Quaternary Science Reviews* 21, p.295 – 305.

Walker, J. and Lee, K. (2017). Relationship between Acheulean biface dimensions and hand size. *Lithics* 37, p.5 – 14.

Ward, G.R. (1984). Interglacial fossils from Upminster, Essex. London Naturalist 3, p.24 – 26.

Warren, S.H. (1922). The Mesvinian industry of Clacton-on-Sea, Essex. *Proceedings of the Prehistoric Society of East Anglia* 3(4), p.597 – 602.

Warren, S.H. (1926). The classification of the Lower Palaeolithic with especial reference to Essex. *South East Naturalist* 31, p.38 – 50.

Warren, S. H. (1933). The Palaeolithic industries of the Clacton and Dovercourt districts. *Essex Naturalist* 24, p.1—29.

Warren, S.H. (1942). The Drifts of South-Western Essex, Part II. *Essex Naturalist* 27, p.171 – 179.

Wei, G., He, C., Hu, Y., Yu, K., Chen, S., Pang, L., Wu, Y., Huang, W. and Yuan, W. (2017). First discovery of a bone handaxe in China. *Quaternary International* 434, p.121 – 128.

Wenban-Smith F.F. (1998). Clactonian and Acheulian Industries in Britain: their chronology and significance reconsidered. In N. Ashton, F. Healy and P. Pettit (eds), *Stone Age Archaeology: Essays in Honour of John Wymer: Lithic Studies Society Occasional Paper 6*, p.90 – 97. Oxford: Oxbow.

Wenban-Smith, F.F. (2001). 6. As Represented by the Solent River: handaxes from Highfield, Southampton. In R. Hosfield and F.F. Wenban-Smith (eds), *Palaeolithic Archaeology of the Solent River: Lithic Studies Society Occasional Paper 7*, p.57 – 69. Oxford: Oxbow.

Wenban-Smith, F.F. (2004). Handaxe typology and Lower Palaeolithic cultural development: ficrons, cleavers and two giant handaxes from Cuxton. *Lithics* 25, p.11 – 21.

Wenban-Smith, F.F. (2006). Cuxton giant handaxes. *Kent Archaeological Society Newsletter* 68, p.2 – 3.

Wenban-Smith, F.F. (ed.) (2013). *The Ebbsfleet elephant: excavations at Southfleet Road, Swanscombe in advance of High Speed 1, 2003-4 Oxford archaeology monograph No.20*. Oxford: Oxford Archaeology.

Wenban-Smith, F.F. and Bridgland, D.R. (2001). Palaeolithic archaeology at the Swan Valley Community School, Swanscombe, Kent. *Proceedings of the Prehistoric Society* 67, 219–225.

Wenban-Smith, F.F., Gamble, C.S. and ApSimon, A.M. (2000). The Lower Palaeolithic site at Red Barns, Portchester, Hampshire: bifacial technology, raw material quality and the organisation of Archaic behaviour. *Proceedings of the Prehistoric Society* 66, p.209 – 255.

Wenban-Smith, F.F., Bates, M.R. and Marshall, G.D. (eds) (2007). *Medway Valley Palaeolithic project final report: The Palaeolithic resource in the Medway gravels (Kent*). Unpublished report submitted to English Heritage.

Wenban-Smith, F., Bates, M., Bridgland, D., Harp, P., Pope, M. and Roberts, M. (eds) (2010). *South-east Research Framework (SERF), the Early Palaeolithic: Resource Assessment & Research Agenda*. Technical Report, Kent County Council.

Wenban-Smith, F.F., Bates, M.R., Bridgland, D.R., Harp, P., Pope, M., and Roberts, M. (2019). *The Early Palaeolithic in the South-East, South-East Research Framework: Resource Assessment and Research Agenda for the Early Palaeolithic*. Research Agenda, Kent County Council, URL: https://www.kent.gov.uk/_data/assets/pdf_file/0010/98938/Early-Palaeolithic-chapter.pdf Accessed on April 5th 2021.

Wessex Archaeology, (1993). *The Southern Rivers Palaeolithic Project Report No. 1 1991–1992. The Upper Thames Valley, the Kennet Valley and the Solent Drainage System*. Wessex Archaeology, Salisbury.

West, R.G. (1956). The quaternary deposits at Hoxne, Suffolk. *Philos. Trans. Roy. Soc. B* 239, p.265 – 356.

West, R.G. and McBurney, C.M.B. (1955). The Quaternary deposits at Hoxne, Suffolk, and their archaeology. *Proceedings of the Prehistoric Society* 20(2), p. 131 – 154.

West, R.G., Lambert, C.A. and Sparks, B.W. (1964). Interglacial deposits at Ilford, Essex. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 247(738), p.185 – 212.

Westaway, R. (2002). Long-term river terrace sequences: evidence for global increases in surface uplift rates in the Late Pliocene and early Middle Pleistocene caused by flow in the lower continental crust induced by surface processes. *Netherlands Journal of Geosciences* 81, p.305 – 328.

Westaway, R. (2009). Quaternary vertical crustal motion and drainage evolution in East Anglia and adjoining parts of southern England: chronology of the Ingham River terrace deposits. *Boreas* 38(2), p.261 – 284.

Westaway, R. (2011). A re-evaluation of the timing of the earliest reported human occupation of Britain: the age of the sediments at Happisburgh, eastern England. *Proceedings of the Geologists' Association* 122(3), p.383 – 396.

Westaway, R., Maddy, D. and Bridgland, D. (2002). Flow in the lower continental crust as a mechanism for the Quaternary uplift of south-east England: constraints from the Thames terrace record. *Quaternary Science Reviews* 21(4-6), p.559 – 603.

Westaway, R., Bridgland, D.R. and White, M.J. (2006). The Quaternary uplift history of central southern England: evidence from the terraces of the Solent River system and nearby raised beaches. *Quaternary Science Reviews* 25(17-18), p.2212 – 2250.

Westlake, E. (1889). *Outlines of the geology of Fordingbridge and neighbourhood, including the Valley of the Avon*. Fordingbridge: Titus Mitchell.

Wetzel, R. and Bosinski, G. (1969). *Die Bocksteinschmiede im Lonetal*. Stuttgart: Verlag Müller und Gräff.

William, T. (2005). New finds of Palaeolithic handaxes from Lincolnshire. *Lithics* 26, p.90 – 100.

Wiseman, A.L., Stringer, C.B., Ashton, N., Bennett, M.R., Hatala, K.G., Duffy, S., O'Brien, T. and De Groote, I. (2020). The morphological affinity of the Early Pleistocene footprints from Happisburgh, England, with other footprints of Pliocene, Pleistocene, and Holocene age. *Journal of Human Evolution* 144, p.102776.

Wiśniewski, A. (2014). The beginnings and diversity of Levallois methods in the early Middle Palaeolithic of Central Europe. *Quaternary International* 326, p.364 – 380.

Wiśniewski, A., Chłoń, M., Weiss, M., Pyżewicz, K. and Migal, W. (2020). On Making of Micoquian Bifacial Backed Tools at Pietraszyn 49a, SW Poland. *Journal of Palaeolithic Archaeology* 3, p.856 – 888.

White, H.J.O. (1912). *The Geology of the Country around Winchester and Stockbridge*. London: Memoir of the Geological Survey.

White, H.J.O. and Treacher, L. (1901). Excursion to Twyford and the Wargrave Outlier: Saturday, July 6th, 1901. *Proceedings of the Geologists' Association* 17(4), p.176 – 181.

White, M. (1995). Raw materials and biface variability in Southern Britain: a preliminary examination. *Lithics* 15, p.1 – 20.

White, M.J. (1996). *Biface Variability and Human Behaviour in the Earlier Palaeolithic: a study from south-eastern England*. Unpublished doctoral dissertation, University of Cambridge.

White. M.J. (1997). Investigations of an earlier Palaeolithic site at White's Pit, Santon Downham, Suffolk 1994-5. *Lithics* 17, p.9 – 14.

White, M.J. (1998a). Twisted ovate bifaces in the British Lower Palaeolithic: Some observations and implications. In N. Ashton, F. Healy, and P. Pettitt (eds), *Stone Age Archaeology: Essays in honour of John Wymer: Lithic Studies Society Occasional Paper 6*, p.98–104. Oxford: Oxbow.

White, M.J. (1998b). On the significance of Acheulean biface variability in southern Britain. *Proceedings of the Prehistoric Society* 64, p.15–44.

White, M.J. (2000). The Clactonian question: on the interpretation of core-and-flake assemblages in the British Lower Paleolithic. *Journal of World Prehistory* 14(1), p.1 – 63.

White, M.J. (2006). Axing cleavers: reflections on broad-tipped large cutting tools in the British Lower and Middle Paleolithic. In N. Goren-Inbar and G. Sharon (eds), *Axe age: Acheulian toolmaking, from quarry to discard*, p.365–386. Jerusalem: Equinox.

White, M.J. (2012): The lithic assemblage from Lynford Quarry and its bearing on Neanderthal behaviour in Late Pleistocene Britain. In B. Boismier, C. Gamble and C. Coward (eds), *Neanderthals among mammoths: Excavationsat Lynford Quarry, Norfolk*, p.219–260. London: English Heritage.

White, M.J. (2015). Dancing to the rhythms of the biotidal zone: settlement history and culture history in Middle Pleistocene Britain. In F. Coward, R. Hosfield, M. Pope and F.F. Wenban-Smith (eds), *Settlement, society and cognition in human evolution: landscapes in mind*, p.154 – 173. Cambridge: Cambridge University Press.

White, M.J and Ashton, N. (2003). Lower Palaeolithic core technology and the origins of the Levallois method in north-western Europe. *Current Anthropology* 44(4), p.598 – 609.

White, M.J. and Bridgland, D.R. (2018). Thresholds in lithic technology and human behaviour in MIS 9 Britain. In M. Pope, J. McNabb and C. Gamble (eds), *Crossing the Human Threshold: Dynamic*

Transformation and Persistent Places during the Middle Pleistocene, p.165 – 192. Abingdon: Routledge.

White, M.J. and Foulds, F. (2018). Symmetry is its own reward: on the character and significance of Acheulean handaxe symmetry in the Middle Pleistocene. *Antiquity* 92(362), p.304 – 319.

White, M.J. and Jacobi, R.M. (2002). Two sides to every story: bout coupé handaxes revisited. *Oxford Journal of Archaeology* 21(2), p.109 – 133.

White, M.J. and Pettitt, P. (1995). Technology of Early Palaeolithic western Europe: innovation, variability and a unified framework. *Lithics* 16, p. 27 – 40.

White, M.J. and Plunkett, S.J. (2004). *Miss Layard excavates: a palaeolithic site at Foxhall Road, Ipswich, 1903-1905*. Liverpool: Western Academic & Specialist Press.

White, M.J. and Schreve, D.C. (2000). Insular Britain-Peninsula Britain: Palaeogeography, colonisation and settlement history of Lower Palaeolithic Britain. *Proceedings of the Prehistoric Society* 66, p.1 – 28.

White, M.J., Mitchell, J., Bridgland, D. and McNabb, J. (1998). Rescue Excavations at an Acheulean Site at Southend Road, South Woodford, London Borough of Redbridge, E18 (TQ 407905). *Archaeological Journal* 155(1), p.1 – 21.

White, M., Scott, B. and Ashton, N. (2006). The Early Middle Palaeolithic in Britain: archaeology, settlement history and human behaviour. *Journal of Quaternary Science* 21(5), p.525 – 541.

White, M., Ashton, N. and Scott, B. (2011). The emergence, diversity and significance of Mode 3 (prepared core) technologies. *Developments in quaternary sciences* 14, p.53 – 65.

White, M.J., Bridgland, D.R., Schreve, D.C., White, T.S. and Penkman, K.E. (2018). Well-dated fluvial sequences as templates for patterns of handaxe distribution: Understanding the record of Acheulean activity in the Thames and its correlatives. *Quaternary International* 480, p.118 – 131.

White, M.J., Ashton, N. and Bridgland, D. (2019). Twisted handaxes in Middle Pleistocene Britain and their implications for regional-scale cultural variation and the deep history of Acheulean hominin groups. *Proceedings of the Prehistoric Society* 85, p. 61 – 81.

White, T.S., Preece, R.C. and Whittaker, J.E. (2013). Molluscan and ostracod successions from Dierden's Pit, Swanscombe: insights into the fluvial history, sea-level record and human occupation of the Hoxnian Thames. *Quaternary Science Reviews* 70, p.73–90.

White, T.S., Bridgland, D.R., Westaway, R. and Straw, A. (2017). Evidence for late Middle Pleistocene glaciation of the British margin of the southern North Sea. *Journal of Quaternary Science* 32(2), p.261 – 275.

Whittaker, J. (1994). *Flintknapping: making and understanding stone tools*. Austin: University of Texas Press.

Whittaker, J. and McCall, G. (2001). Handaxe-hurling hominids: An unlikely story. *Current Anthropology* 42(4), p.566 – 572.

Whittaker, K. (1990). *Report on the Archaeological Potential of Lower Twydall Chalk Pit, Gillingham, Kent and the Implications for the Plans Proposed by Kent Reclamation Limited*. Lower Medway Archaeological Research Group.

Wobst H.M., 1974. Boundary conditions for palaeolithic social systems: a simulation approach. *American Antiquities* 39, p.147–178.

Wolpoff, M.H. (1980). Cranial remains of middle Pleistocene European hominids. *Journal of Human Evolution* 9(5), p.339 – 358.

Wyatt, J. (1861). On a Recent Finding of Flint-Implements at Bedford. *The Geologist* 4(6), p.242 – 246.

Wyatt, J. (1862). On some further discoveries of flint implements in the gravel near Bedford. *Journal of the Geological Society of London* 18, p.113 – 115.

Wyatt, J. (1864). Further discoveries of flint implements and fossil mammals in the valley of the Ouse. *Quarterly Journal of the Geological Society* 20(1 – 2), p.183 – 188.

Wymer, J.J. (1961). The Lower Palaeolithic succession in the Thames Valley and the date of the ancient channel between Caversham and Henley, Oxon. *Proceedings of the Prehistoric Society* 27, p. 1 – 27.

Wymer J.J. (1968). *Lower Palaeolithic Archaeology in Britain as represented by the Thames Valley*. London: John Baker.

Wymer, J.J. (1969). The Use of Archaeological and Faunal Material in Dating River Deposits: With Some Illustrations from Thames Valley Sites. *Area* 1(2), p.29 – 31.

Wymer, J.J. (1977). *A Note on the Palaeolithic Artefacts from Southend Rd. Woodford*. Unpublished manuscript, currently in the care of M. White.

Wymer, J.J. (1982). *The Palaeolithic Age*. London: Croom Helm Ltd.

Wymer, J.J. (1985). *The Palaeolithic Sites of East Anglia*. Norwich: Geo Books.

Wymer, J.J. (1999). *The lower Palaeolithic occupation of Britain*. Salisbury: Wessex Archeology & English Heritage.

Wymer, J.J. and Straw, A. (1977). Hand-axes from beneath Glacial Till at Welton-le-Wold, Lincolnshire and the Distribution of Palaeoliths in Britain. *Proceedings of the Prehistoric Society* 43, p. 355 – 360.

Wymer, J.J., Singer, R. and Gladfelter, B.G. (1993). *The Lower Palaeolithic Site at Hoxne, England*. Chicago: University of Chicago Press.

Wynn, T. (2002). Archaeology and cognitive evolution. *Behaviour and Brain Science* 25, p.389 – 438.

Wynn, T. (2021). Ergonomic clusters and displaced affordances in Early Lithic Technology. *Adaptive Behavior* 29(2), p.181 – 195.

Wynn, T. and Berlant, T. (2019). The handaxe aesthetic. In K.A. Overmann and F.L. Coolidge (eds), *Squeezing Minds from Stones*, p. 278 – 303. Oxford: Oxford University Press.

Wynn, T. and Gowlett, J. (2018). The handaxe reconsidered. *Evolutionary Anthropology: Issues, News, and Reviews* 27(1), p.21 – 29.

Wynn, T. and Tierson, F. (1990). Regional comparison of the shapes of later Acheulean handaxes. *American Anthropologist* 92(1), p.73 – 84.

Young, R.C. (1984). *Aspects of the Middle and Upper Pleistocene of the upper Ouse basin*. Unpublished doctoral dissertation, University of London.

Zaidner, Y. and Weinstein-Evron, M. (2016). The end of the Lower Paleolithic in the Levant: the Acheulo-Yabrudian lithic technology at Misliya Cave, Israel. *Quaternary international* 409, p. 9 – 22.

Zeuner, F.E. (1945). *The Pleistocene Period: Its Climate, Chronology and faunal successions*. London: Hutchinson Scientific & Technical.

Zutovski, K. and Barkai, R. (2016). The use of elephant bones for making Acheulian handaxes: A fresh look at old bones. *Quaternary international* 406, p.227 – 238.